Installation Guide

ECL Comfort 310, application A361

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1.1 Important safety and product information

1.1.1 Important safety and product information

This Installation Guide is associated with ECL Application Key A361 (order code no. 087H3804).

The functions can be realized with ECL Comfort 310.

The application A361 complies with ECL Comfort controller 310 as of software version 1.10 (visible at start-up of the controller and in 'Common controller settings' in 'System').

Additional documentation for ECL Comfort 210 and 310, modules and accessories is available on *http://den.danfoss.com/*.

⚠

Safety Note
To avoid injury of persons and damages to the device, it is absolutely necessary to read and observe these instructions carefully.

Necessary assembly, start-up, and maintenance work must be performed by qualified and authorized personnel only.

The warning sign is used to emphasize special conditions that should be taken into consideration.

This symbol indicates that this particular piece of information should be read with special attention.

As this Installation Guide covers several system types, special system settings will be marked with a system type. All system types are shown in the chapter: 'Identifying your system type'.

°C (degrees Celsius) is a measured temperature value whereas K (Kelvin) is a number of degrees.

The ID no. is unique for the selected parameter.

Example	First digit	Second digit	Last three digits
11174	1	1	174
	-	Circuit 1	Parameter no.
12174	1	2	174
	-	Circuit 2	Parameter no.

If an ID description is mentioned more than once, it means that there are special settings for one or more system types. It will be marked with the system type in question (e.g. 12174 - A266.9).

Disposal Note

This product should be dismantled and its components sorted, if possible, in various groups before recycling or disposal.

Always follow the local disposal regulations.

2.0 Installation

2.1 Before you start

The application **A361.1** is very flexible. These are the basic principles:

Heating (circuit 1 and 2):
Typically, the flow temperature is adjusted according to your requirements. The flow temperature sensor S3 (circuit 1) and S4 (circuit 2) are the most important sensors. The desired flow temperatures at S3 and S4 are calculated in the ECL controller, based on the outdoor temperature (S1). The lower the outdoor temperature, the higher the desired flow temperature.

By means of a week schedule, the heating circuit can be in 'Comfort' or 'Saving' mode (two different temperature values for desired room temperature).

The motorized control valves M1 (circuit 1) and M2 (circuit 2) are opened gradually when the flow temperature is lower than the desired flow temperature and vice versa.

The return temperatures S5 (circuit 1) and S6 (circuit 2) to the district heating supply should not be too high. If so, the desired flow temperature can be adjusted (typically to a lower value), thus resulting in a gradual closing of the motorized control valves.

In boiler-based heating supply the return temperature should not be too low (same adjustment procedure as above).

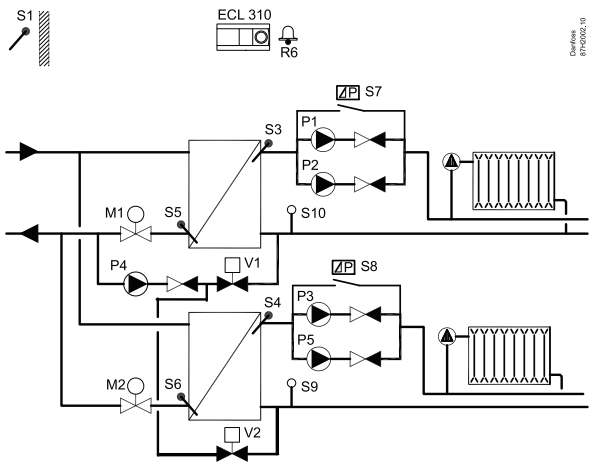
Furthermore, the return temperature limitation can be dependent of the outdoor temperature. Typically, the lower the outdoor temperature, the higher the accepted return temperature.

The circulation pump in question is ON at heat demand or at frost protection.

The heating can be switched OFF when the outdoor temperature is higher than a selectable value.

The static pressure on the secondary side (consumer side) can 1) be measured as a 0 - 10 V signal (from a pressure transmitter) or 2) be a switch signal from a pressure switch. In case of a too low pressure, the refill water function will supplement with water from the supply side.

Typical A361.1 application:



The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

S1	*Outdoor temperature sensor*
S3	*Flow temperature sensor, circuit 1*
S4	*Flow temperature sensor, circuit 2*
S5	*Return temperature sensor, circuit 1*
S6	*Return temperature sensor, circuit 2*
S7	*Differential pressure switch, circuit 1*
S8	*Differential pressure switch, circuit 2*
S9	*Pressure transmitter or pressure switch, circuit 2*
S10	*Pressure transmitter or pressure switch, circuit 1*
P1	*Circulation pump, circuit 1*
P2	*Circulation pump, circuit 1*
P3	*Circulation pump, circuit 2*
P4	*Refill water pump*
P5	*Circulation pump, circuit 2*
M1	*Motorized control valve, circuit 1*
M2	*Motorized control valve, circuit 2*
V1	*Solenoid valve, circuit 1, refill water valve*
V2	*Solenoid valve, circuit 2, refill water valve*
R6	*Relay output, alarm*

Application A361.1 in general:

The circulation pumps P1 and P2 (circuit 1) / P3 and P5 (circuit 2) work in shift according to a schedule. One pump is used as spare pump and the other pump is working. In case of malfunction (missing differential pressure) of one pump, the other pump will take over. An alarm will be generated and the defective pump can be inspected / repaired.

Alarm (relay 6) can be activated if:

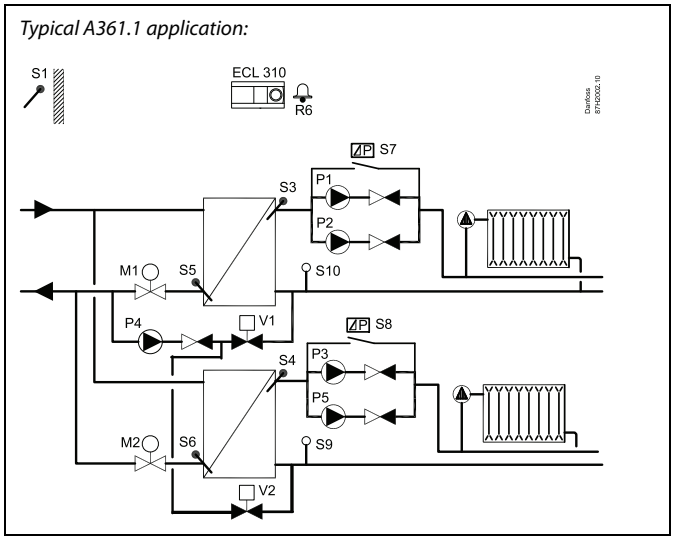
- The actual flow temperature differs from the desired flow temperature.
- The activated circulation pump does not generate a pressure difference.
- The refill water function does not generate a pressure within a preset time.

Modbus communication to a SCADA system can be established.

M-bus communication enables connection to flow or energy meter. The controller can limit the flow or energy to a set maximum but also in relation to the outdoor temperature.

Furthermore, the M-bus data can be transferred to the Modbus communication.

Typical A361.1 application:



The application **A361.2** is very flexible. These are the basic principles:

Heating (circuit 1 and 2):
Typically, the flow temperature is adjusted according to your requirements. The flow temperature sensor S3 (circuit 1) and S4 (circuit 2) are the most important sensors. The desired flow temperatures at S3 and S4 are calculated in the ECL controller, based on the outdoor temperature (S1). The lower the outdoor temperature, the higher the desired flow temperature.

The supply temperature (S2) is used to 1) control the S3 and S4 temperatures in relation to the S2 temperature or 2) maximize the limit of the desired flow temperature.

The factory setting, where the supply temperature (S2) determines the desired flow temperature, does not change the desired flow temperature according to 'Comfort' or 'Saving' mode.

However, if the supply temperature (S2) determines a max. limitation of the desired flow temperature, the 'Comfort' and 'Saving' mode will have two different temperature values for desired room temperature.

The motorized control valves M1 (circuit 1) and M2 (circuit 2) are opened gradually when the flow temperature is lower than the desired flow temperature and vice versa.

The return temperatures S5 (circuit 1) and S6 (circuit 2) to the district heating supply should not be too high. If so, the desired flow temperature can be adjusted (typically to a lower value), thus resulting in a gradual closing of the motorized control valves.

In boiler-based heating supply the return temperature should not be too low (same adjustment procedure as above).

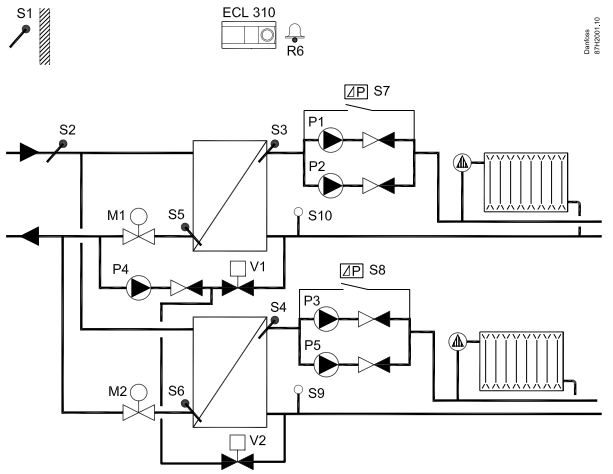
Furthermore, the return temperature limitation can be dependent of the outdoor temperature. Typically, the lower the outdoor temperature, the higher the accepted return temperature.

The circulation pump in question is ON at heat demand or at frost protection.

The heating can be switched OFF when the outdoor temperature is higher than a selectable value.

The static pressure on the secondary side (consumer side) can 1) be measured as a 0 - 10 V signal (from a pressure transmitter) or 2) be a switch signal from a pressure switch. In case of a too low pressure, the refill water function will supplement with water from the supply side.

Typical A361.2 application:



The shown diagram is a fundamental and simplified example and does not contain all components that are necessary in a system.

All named components are connected to the ECL Comfort controller.

List of components:

S1	*Outdoor temperature sensor*
S2	*Supply flow temperature sensor*
S3	*Flow temperature sensor, circuit 1*
S4	*Flow temperature sensor, circuit 2*
S5	*Return temperature sensor, circuit 1*
S6	*Return temperature sensor, circuit 2*
S7	*Differential pressure switch, circuit 1*
S8	*Differential pressure switch, circuit 2*
S9	*Pressure transmitter or pressure switch, circuit 2*
S10	*Pressure transmitter or pressure switch, circuit 1*
P1	*Circulation pump, circuit 1*
P2	*Circulation pump, circuit 1*
P3	*Circulation pump, circuit 2*
P4	*Refill water pump*
P5	*Circulation pump, circuit 2*
M1	*Motorized control valve, circuit 1*
M2	*Motorized control valve, circuit 2*
V1	*Solenoid valve, circuit 1, refill water valve*
V2	*Solenoid valve, circuit 2, refill water valve*
R6	*Relay output, alarm*

Application A361.2 in general:

The circulation pumps P1 and P2 (circuit 1) / P3 and P5 (circuit 2) work in shift according to a schedule. One pump is used as spare pump and the other pump is working. In case of malfunction (missing differential pressure) of one pump, the other pump will take over. An alarm will be generated and the defective pump can be inspected / repaired.

Alarm (relay 6) can be activated if:

- The actual flow temperature differs from the desired flow temperature.
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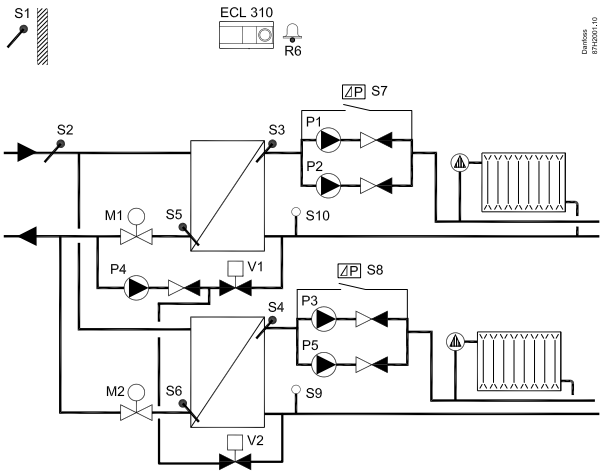
Furthermore, the M-bus data can be transferred to the Modbus communication.

Typical A361.2 application:



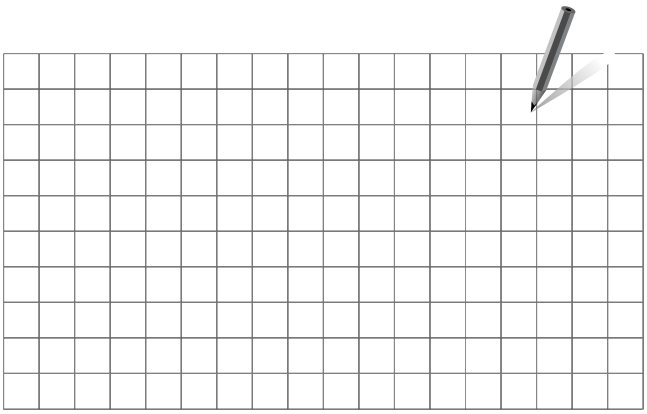
The controller is pre-programmed with factory settings that are shown in the relevant chapters of this guide.

2.2 Identifying the system type

Sketch your application

The ECL Comfort controller series is designed for a wide range of heating, domestic hot-water (DHW) and cooling systems with different configurations and capacities. If your system differs from the diagrams shown here, you may want to make a sketch of the system about to be installed. This makes it easier to use the Installation Guide, which will guide you step-by-step from installation to final adjustments before the end-user takes over.

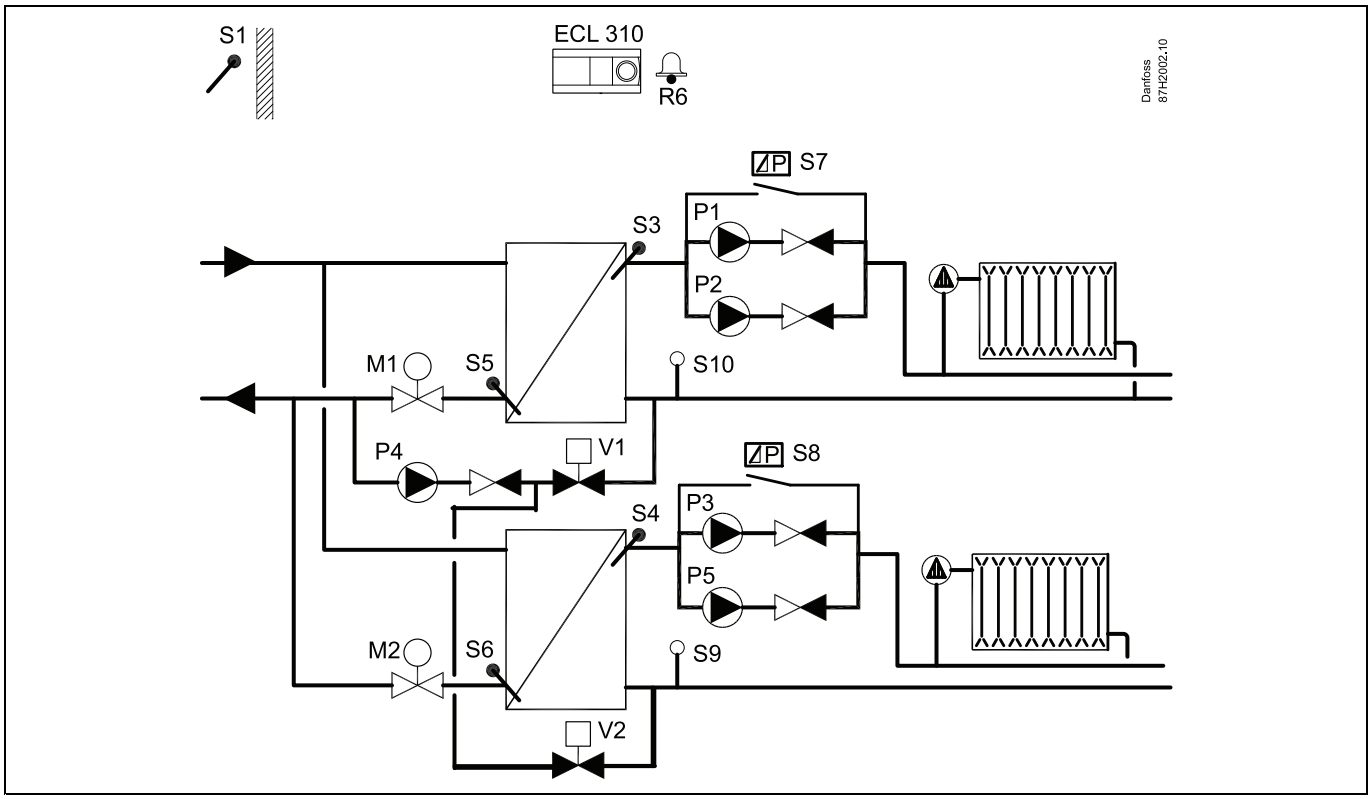
The ECL Comfort controller is a universal controller that can be used for various systems. Based on the shown standard systems, it is possible to configure additional systems. In this chapter you find the most frequently used systems. If your system is not quite as shown below, find the diagram which has the best resemblance with your system and make your own combinations.



The circulation pump(s) in heating circuit(s) can be placed in the flow as well as the return. Place the pump according to the manufacturer's specification.

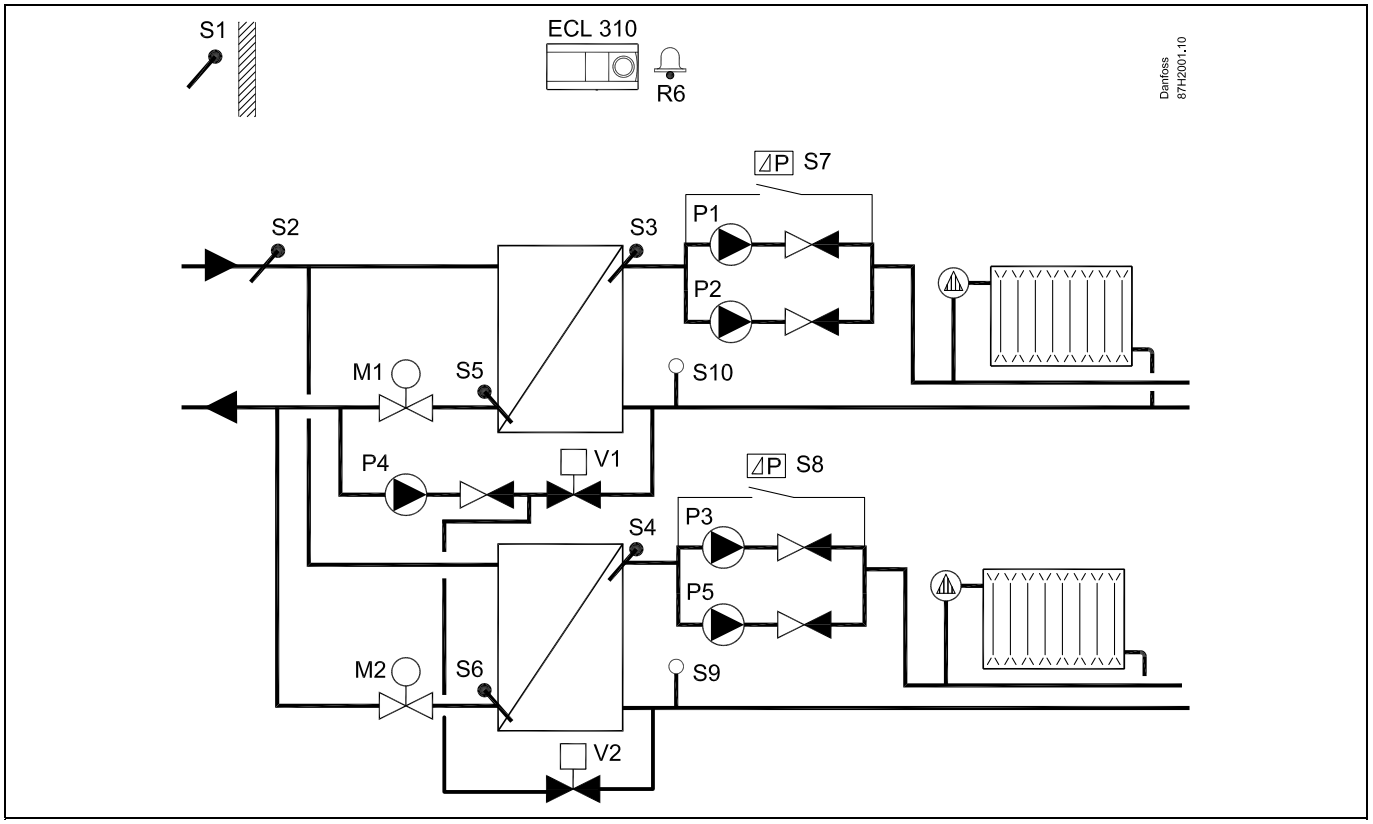
A361.1

Indirectly connected heating systems with two-pump control and refill water function:



A361.2

Indirectly connected heating systems with two-pump control and refill water function (supply temperature measurement gives further control / limitation possibilities):



2.3 Mounting

2.3.1 Mounting the ECL Comfort controller

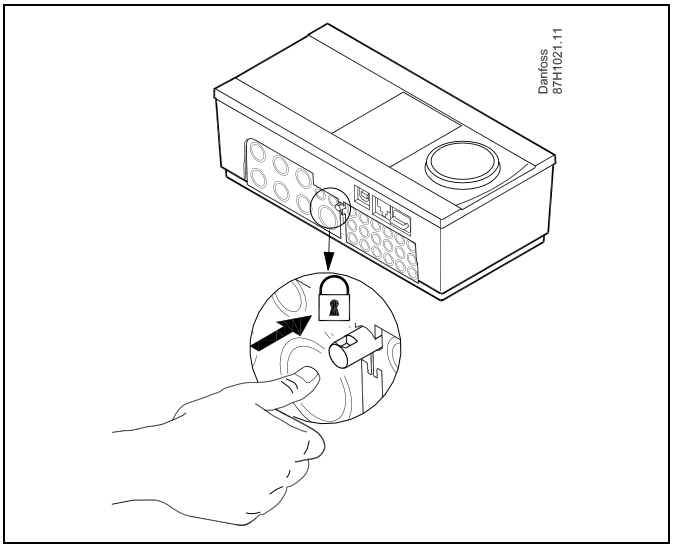
For easy access, you should mount the ECL Comfort controller near the system. Select one of the following methods using the same base part (code no. 087H3220):

- Mounting on a wall
- Mounting on a DIN rail (35 mm)

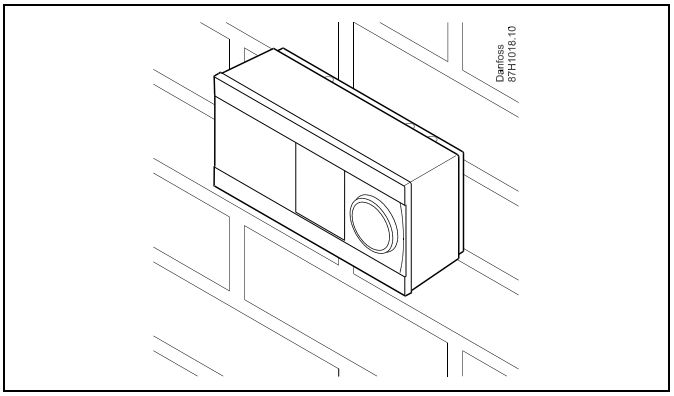
The ECL Comfort 310 is to be mounted in the ECL Comfort 310 base part.

Screws, PG cable glands and rawlplugs are not supplied.

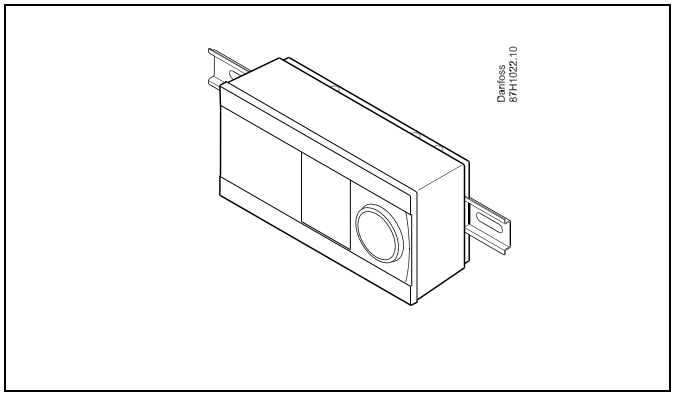
Locking the ECL Comfort controller
In order to fasten the ECL Comfort controller to its base part, secure the controller with the locking pin.



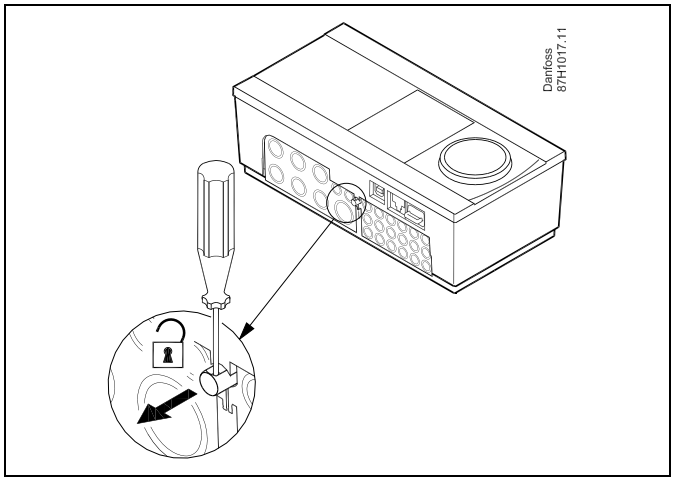
Mounting on a wall
Mount the base part on a wall with a smooth surface. Establish the electrical connections and position the controller in the base part. Secure the controller with the locking pin.



Mounting on a DIN rail (35 mm)
Mount the base part on a DIN rail. Establish the electrical connections and position the controller in the base part. Secure the controller with the locking pin.



Dismounting the ECL Comfort controller
In order to remove the controller from the base part, pull out the locking pin by means of a screwdriver. The controller can now be removed from the base part.



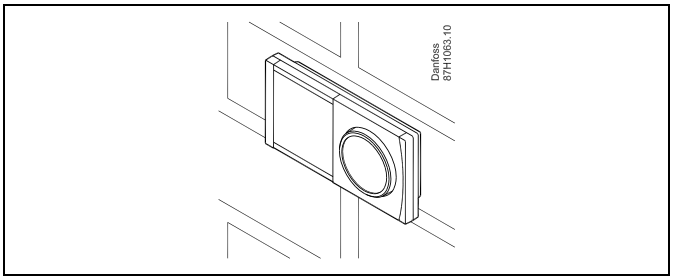
2.3.2 Mounting the Remote Control Units ECA 30/31

Select one of the following methods:

- Mounting on a wall, ECA 30 / 31
- Mounting in a panel, ECA 30

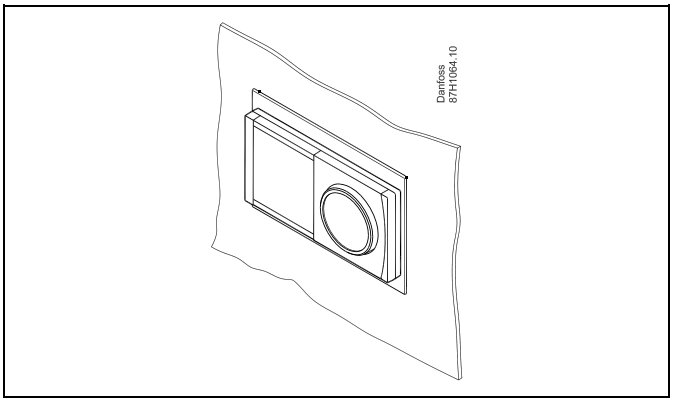
Screws and rawlplugs are not supplied.

Mounting on a wall
Mount the base part of the ECA 30 / 31 on a wall with a smooth surface. Establish the electrical connections. Place the ECA 30 / 31 in the base part.



Mounting in a panel
Mount the ECA 30 in a panel using the ECA 30 frame kit (order code no. 087H3236). Establish the electrical connections. Secure the frame with the clamp. Place the ECA 30 in the base part. The ECA 30 can be connected to an external room temperature sensor.

The ECA 31 must not be mounted in a panel if the humidity function is to be used.



2.4 Placing the temperature sensors

2.4.1 Placing the temperature sensors

It is important that the sensors are mounted in the correct position in your system.

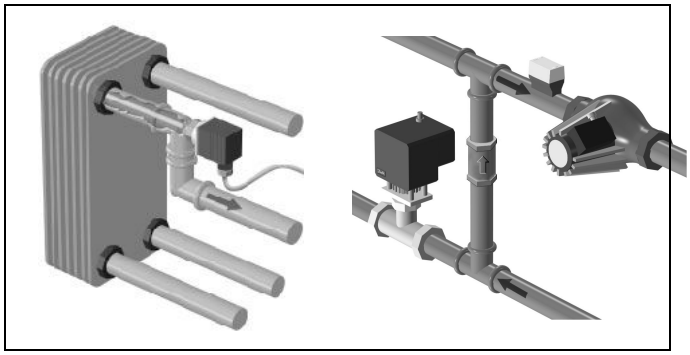
The temperature sensor mentioned below are sensors used for the ECL Comfort 210 and 310 series which not all will be needed for your application!

Outdoor temperature sensor (ESMT)
The outdoor sensor should be mounted on that side of the building where it is less likely to be exposed to direct sunshine. It should not be placed close to doors, windows or air outlets.

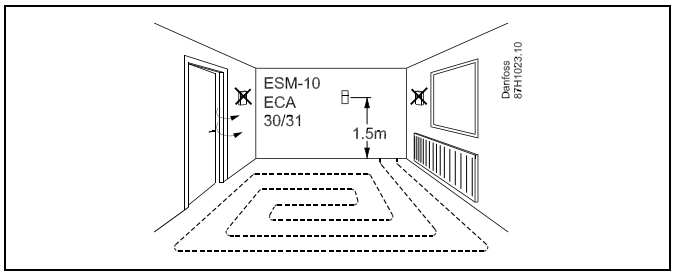
Flow temperature sensor (ESMU, ESM-11 or ESMC)
Place the sensor max. 15 cm from the mixing point. In systems with heat exchanger, Danfoss recommends that the ESMU-type to be inserted into the exchanger flow outlet.

Make sure that the surface of the pipe is clean and even where the sensor is mounted.

Return temperature sensor (ESMU, ESM-11 or ESMC)
The return temperature sensor should always be placed so that it measures a representative return temperature.



Room temperature sensor (ESM-10, ECA 30 / 31 Remote Control Unit)
Place the room sensor in the room where the temperature is to be controlled. Do not place it on outside walls or close to radiators, windows or doors.



Boiler temperature sensor (ESMU, ESM-11 or ESMC)
Place the sensor according to the boiler manufacturer's specification.

Air duct temperature sensor (ESMB-12 or ESMU types)
Place the sensor so that it measures a representative temperature.

DHW temperature sensor (ESMU or ESMB-12)
Place the DHW temperature sensor according to the manufacturer's specification.

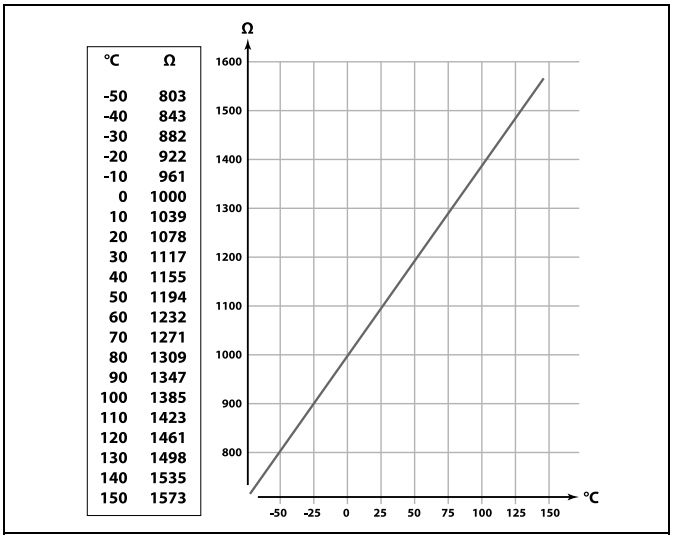
Slab temperature sensor (ESMB-12)
Place the sensor in a protection tube in the slab.

ESM-11: Do not move the sensor after it has been fastened in order to avoid damage to the sensor element.

Pt 1000 temperature sensor (IEC 751B, 1000 Ω / 0 °C)

Relationship between temperature and ohmic value:

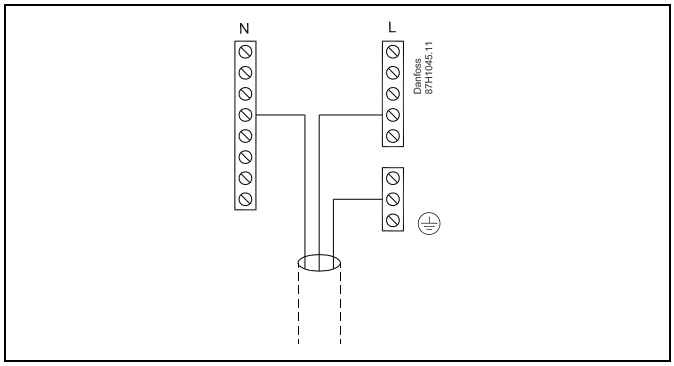
°C	Ω
-50	803
-40	843
-30	882
-20	922
-10	961
0	1000
10	1039
20	1078
30	1117
40	1155
50	1194
60	1232
70	1271
80	1309
90	1347
100	1385
110	1423
120	1461
130	1498
140	1535
150	1573



2.5 Electrical connections

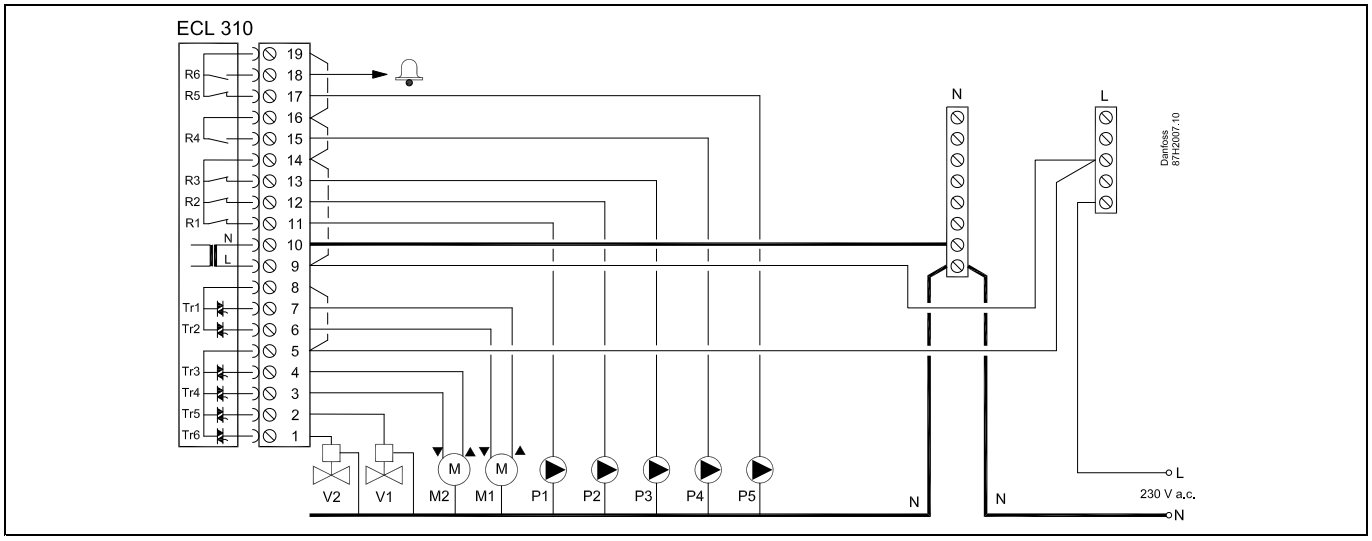
2.5.1 Electrical connections 230 V a.c. in general

The common ground terminal is used for connection of relevant components (pumps, motorized control valves).



2.5.2 Electrical connections, 230 V a.c., power supply, pumps, motorized control valves etc.

Application A361.1 / A361.2



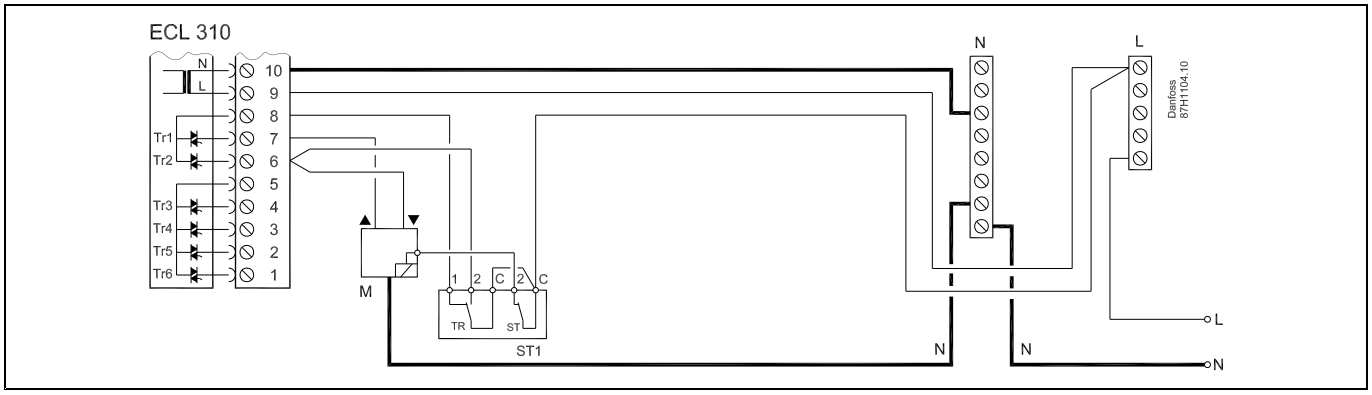
Terminal		Description	Max. load
19		Phase for circulation pump and alarm	
18		Alarm	4 (2) A / 230 V a.c.*
17	P5	Circulation pump ON / OFF, circuit 2	4 (2) A / 230 V a.c.*
16		Phase for circulation pump	
15	P4	Refill water pump ON / OFF	4 (2) A / 230 V a.c.*
14		Phase for circulation pumps	
13	P3	Circulation pump ON / OFF, circuit 2	4 (2) A / 230 V a.c.*
12	P2	Circulation pump ON / OFF, circuit 1	4 (2) A / 230 V a.c.*
11	P1	Circulation pump ON / OFF, circuit 1	4 (2) A / 230 V a.c.*
10		Supply voltage 230 V a.c. - neutral (N)	
9		Supply voltage 230 V a.c. - live (L)	
8	M1	Phase for motorized control valve output, circuit 1	
7	M1	Actuator - opening	0.2 A / 230 V a.c.
6	M1	Actuator - closing	0.2 A / 230 V a.c.
5	M2	Phase for motorized control valve output, circuit 2	
4	M2	Actuator - opening	0.2 A / 230 V a.c.
3	M2	Actuator - closing	0.2 A / 230 V a.c.
2	V1	Solenoid valve, circuit 1, refill water function	0.2 A / 230 V a.c.
1	V2	Solenoid valve, circuit 2, refill water function	0.2 A / 230 V a.c.
* Relay contacts: 4 A for ohmic load, 2 A for inductive load			

Factory established jumpers:
5 to 8, 9 to 14, 14 to 16, 16 to 19, L to 5 and L to 9, N to 10

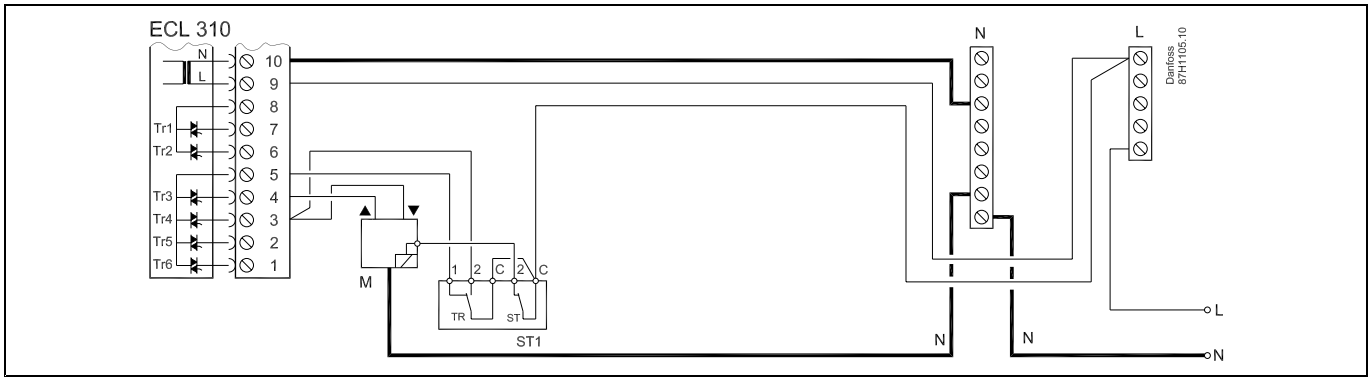
Wire cross section: 0.5 - 1.5 mm²
Incorrect connection can damage the electronic outputs.
Max. 2 x 1.5 mm² wires can be inserted into each screw terminal.

2.5.3 Electrical connections, safety thermostats, 230 V a.c. or 24 V a.c.

With safety thermostat, circuit 1:



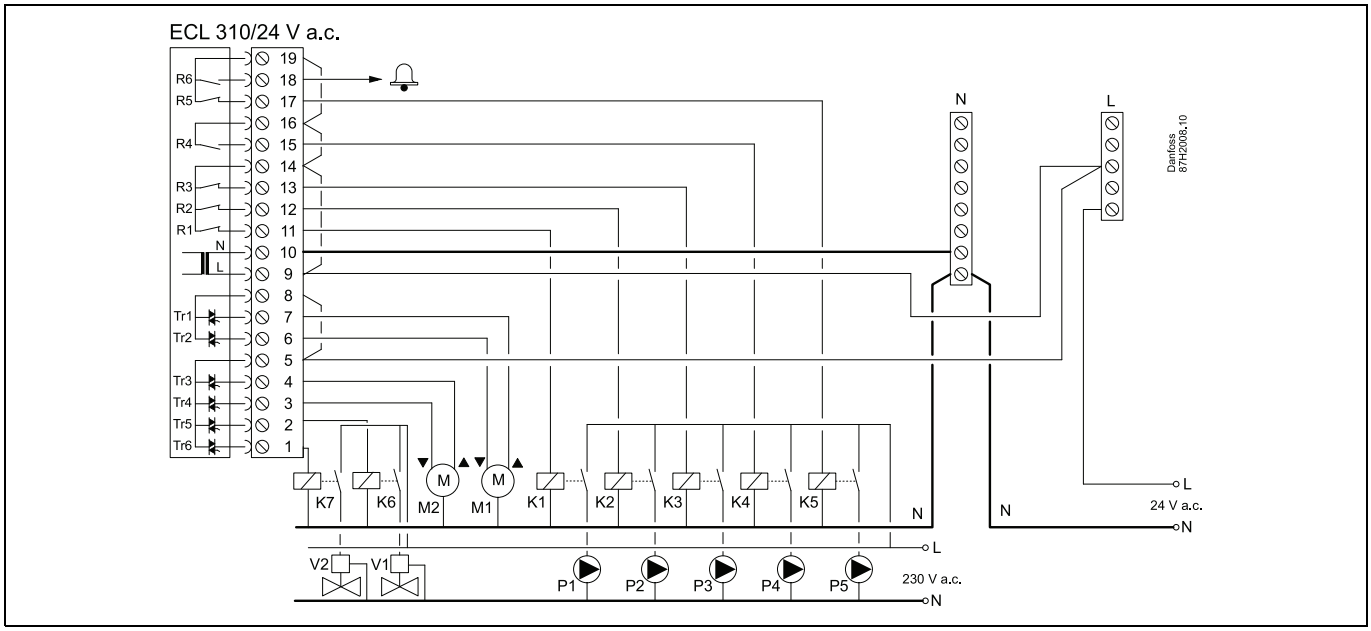
With safety thermostat, circuit 2:



Wire cross section: 0.5 - 1.5 mm²
Incorrect connection can damage the electronic outputs.
Max. 2 x 1.5 mm² wires can be inserted into each screw terminal.

2.5.4 Electrical connections, 24 V a.c., power supply, pumps, motorized valves etc.

Application A361.1 / A361.2



Terminal		Description	Max. load
19		Phase for circulation pump and alarm	
18		Alarm	4 (2) A / 24 V a.c.*
17	K5	Circulation pump ON / OFF, circuit 2	4 (2) A / 24 V a.c.*
16		Phase for circulation pump	
15	K4	Refill water pump ON / OFF	4 (2) A / 24 V a.c.*
14		Phase for circulation pumps	
13	K3	Circulation pump ON / OFF, circuit 2	4 (2) A / 24 V a.c.*
12	K2	Circulation pump ON / OFF, circuit 1	4 (2) A / 24 V a.c.*
11	K1	Circulation pump ON / OFF, circuit 1	4 (2) A / 24 V a.c.*
10		Supply voltage 24 V a.c. - neutral (N)	
9		Supply voltage 24 V a.c. - live (L)	
8	M1	Phase for motorized control valve output, circuit 1	
7	M1	Actuator - opening	1 A / 24 V a.c.
6	M1	Actuator - closing	1 A / 24 V a.c.
5	M2	Phase for motorized control valve output, circuit 2	
4	M2	Actuator - opening	1 A / 24 V a.c.
3	M2	Actuator - closing	1 A / 24 V a.c.
2	K6	Solenoid valve, V1, circuit 1, refill water function	1 A / 24 V a.c.
1	K7	Solenoid valve, V2, circuit 2, refill water function	1 A / 24 V a.c.
* Relay contacts: 4 A for ohmic load, 2 A for inductive load			

Factory established jumpers:
5 to 8, 9 to 14, 14 to 16, 16 to 19, L to 5 and L to 9, N to 10

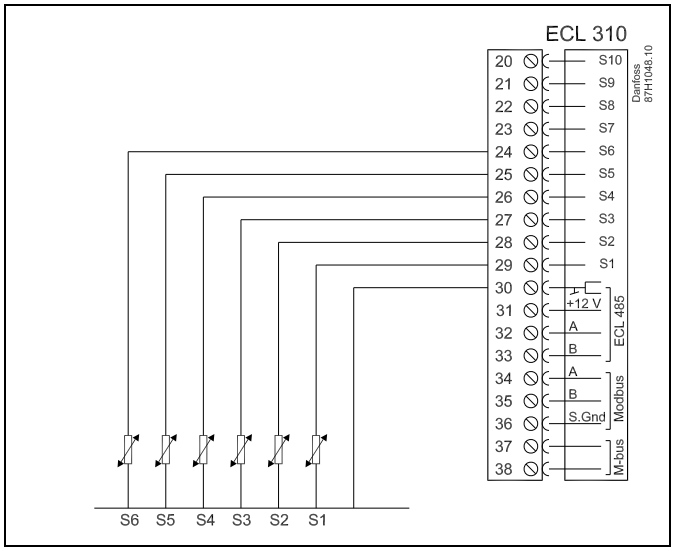
Wire cross section: 0.5 - 1.5 mm²
Incorrect connection can damage the electronic outputs.
Max. 2 x 1.5 mm² wires can be inserted into each screw terminal.

Do not connect 230 V a.c. powered components to a 24 V a.c. power supplied controller directly. Use auxilliary relays (K) to seperate 230 V a.c. from 24 V a.c.

2.5.5 Electrical connections, Pt 1000 temperature sensors and signals

A361.1 / A361.2:

Terminal	Sensor / description		Type (recomm.)
29 and 30	S1	Outdoor temperature sensor*	ESMT
28 and 30	S2	Supply flow temperature sensor**	ESM-11 / ESMB / ESMC / ESMU
27 and 30	S3	Flow temperature sensor***, circuit 1	ESM-11 / ESMB / ESMC / ESMU
26 and 30	S4	Flow temperature sensor***, circuit 2	ESM-11 / ESMB / ESMC / ESMU
25 and 30	S5	Return temperature sensor, circuit 1	ESM-11 / ESMB / ESMC / ESMU
24 and 30	S6	Return temperature sensor, circuit 2	ESM-11 / ESMB / ESMC / ESMU
23 and 30	S7	Differential pressure switch, circuit 1	
22 and 30	S8	Differential pressure switch, circuit 2	
21 and 30	S9	Pressure transmitter (0–10 V or 4–20 mA) or pressure switch, circuit 2	
20 and 30	S10	Pressure transmitter (0–10 V or 4–20 mA) or pressure switch, circuit 1	



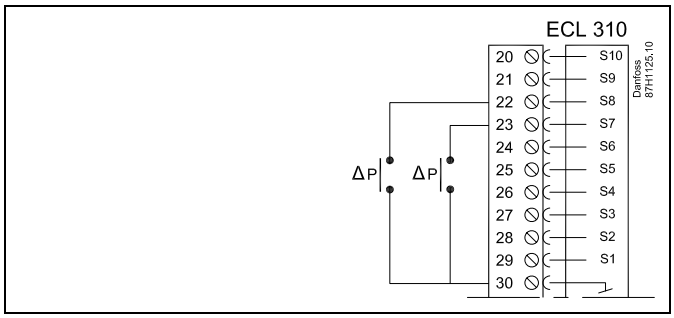
* If the outdoor temperature sensor is not connected or the cable is short-circuited, the controller assumes that the outdoor temperature is 0 (zero) °C.

** Only for application A361.2.

*** The flow temperature sensor must always be connected in order to have the desired functionality. If the sensor is not connected or the cable is short-circuited, the motorized control valve closes (safety function).

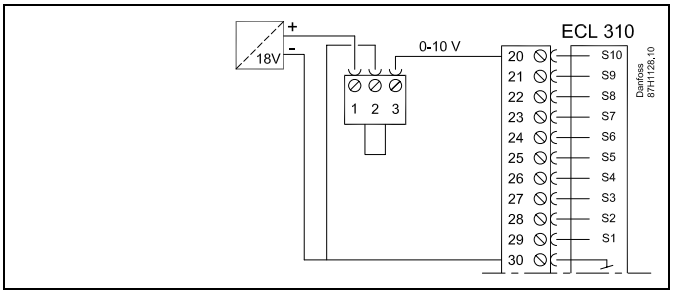
Factory established jumper:
30 to common terminal.

Connection of 2 differential pressure switches



Connection of a pressure transmitter with 0-10 V output

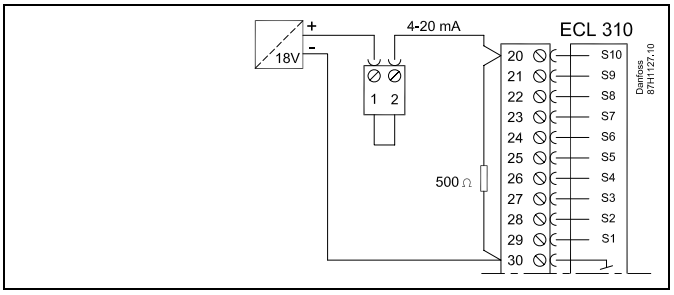
Example of a pressure transmitter connection to S10. Pressure transmitter can be connected in the same way to S9.



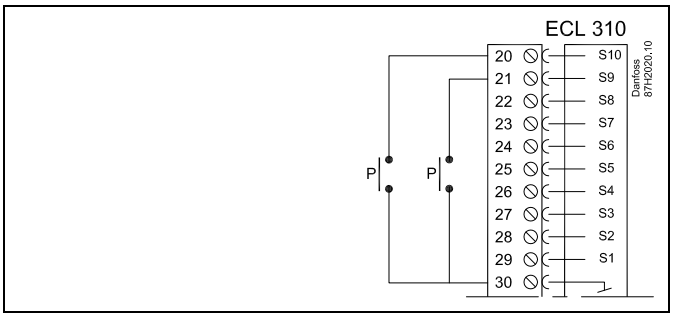
Connection of a pressure transmitter with 4-20 mA output

The 4-20 mA signal is converted to a 2-10 V signal by means of the 500 ohm resistor.

Example of a pressure transmitter connection to S10. Pressure transmitter can be connected in the same way to S9.



Connection of 2 pressure switches



Wire cross section for sensor connections: Min. 0.4 mm².
Total cable length: Max. 200 m (all sensors incl. internal ECL 485 communication bus)
Cable lengths of more than 200 m may cause noise sensibility (EMC).

2.5.6 Electrical connections, ECA 30 / 31

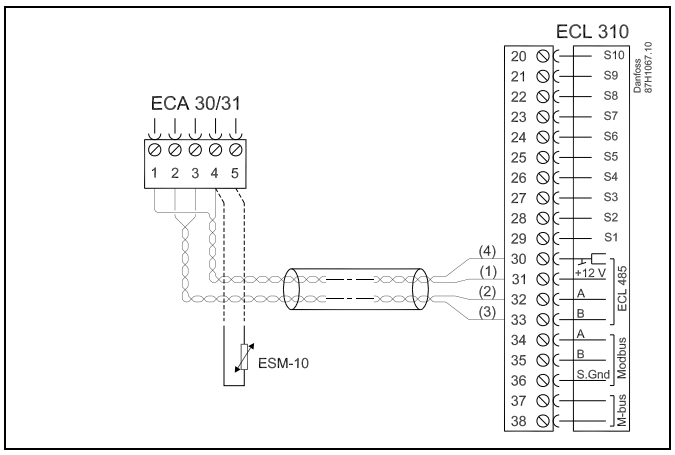
Terminal ECL 310	Terminal ECA 30 / 31	Description	Type (recomm.)
30	4	Twisted pair	Cable 2 x twisted pair
31	1		
32	2	Twisted pair	
33	3		
	4	Ext. room temperature sensor*	ESM-10
	5		

* After an external room temperature sensor has been connected, ECA 30 / 31 must be repowered.

The communication to the ECA 30 / 31 must be set up in the ECL Comfort controller in 'ECA addr.'

The ECA 30 /31 must be set up accordingly.

After application setup the ECA 30 / 31 is ready after 2–5 min. A progress bar in the ECA 30 / 31 is displayed.



ECA information message:
'Application req. newer ECA':
The software of your ECA does not comply with the software of your ECL Comfort controller. Please contact your Danfoss sales office.

Some applications do not contain functions related to actual room temperature. The connected ECA 30 / 31 will only function as remote control.

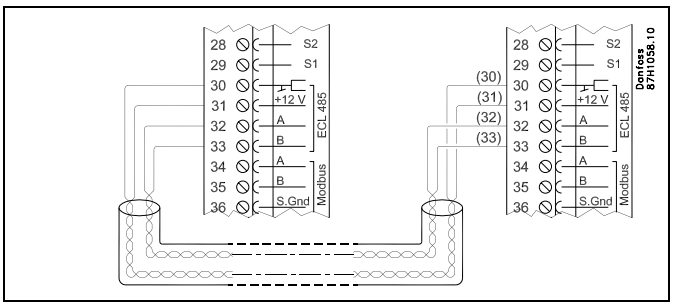
Total cable length: Max. 200 m (all sensors incl. internal ECL 485 communication bus).
Cable lengths of more than 200 m may cause noise sensibility (EMC).

2.5.7 Electrical connections, master / slave systems

The controller can be used as master or slave in master / slave systems via the internal ECL 485 communication bus (2 x twisted pair cable).

The ECL 485 communication bus is not compatible with the ECL bus in ECL Comfort 110, 200, 300 and 301!

Terminal	Description	Type (recomm.)
30	Common terminal	Cable 2 x twisted pair
31*	+12 V*, ECL 485 communication bus	
32	A, ECL 485 communication bus	
33	B, ECL 485 communication bus	
* Only for ECA 30 / 31 and master / slave communication		



Total cable length: Max. 200 m (all sensors incl. internal ECL 485 communication bus).
Cable lengths of more than 200 m may cause noise sensibility (EMC).

2.6 Inserting the ECL Application Key

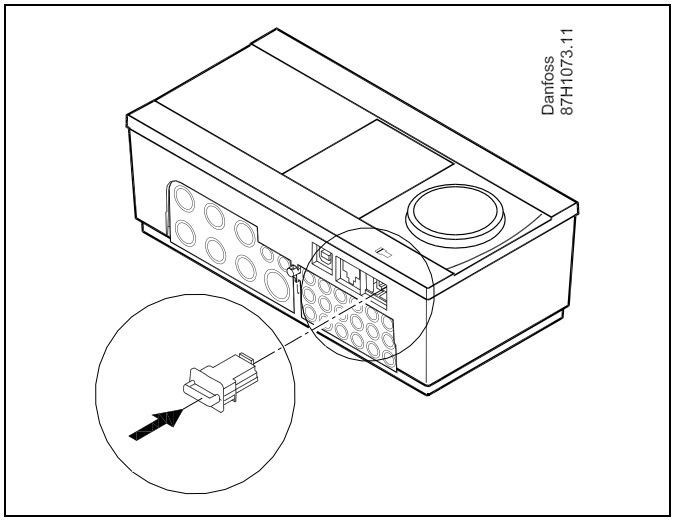
2.6.1 Inserting the ECL Application Key

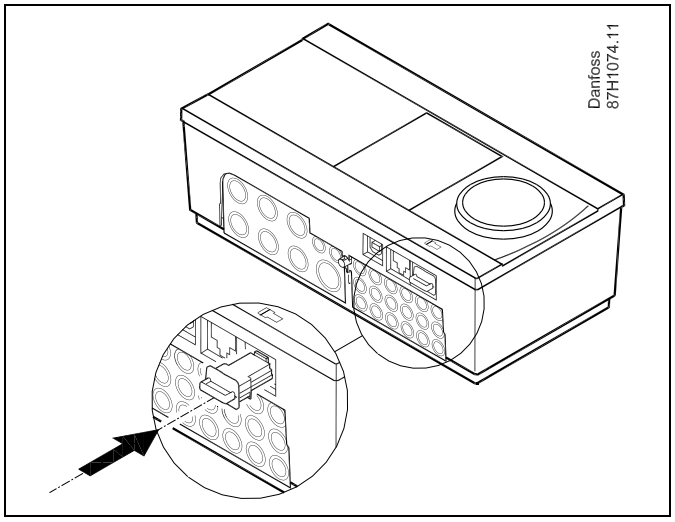
The ECL Application Key contains

- the application and its subtypes,
- currently available languages,
- factory settings: e.g. schedules, desired temperatures, limitation values etc. It is always possible to recover the factory settings,
- memory for user settings: special user / system settings.

After having powered-up the controller, different situations might be existing:

1. The controller is new from the factory, the ECL Application Key is not inserted.
2. The controller already runs an application. The ECL Application Key is inserted, but the application needs to be changed.
3. A copy of the controllers settings is needed for configuring another controller.





User settings are, among others, desired room temperature, desired DHW temperature, schedules, heat curve, limitation values etc.

System settings are, among others, communication set-up, display brightness etc.

Application Key: Situation 1
The controller is new from the factory, the ECL Application Key is not inserted.

An animation for the ECL Application Key insertion is displayed. Insert the Application Key .

Application Key name and Version is indicated (example: A266 Ver. 1.03).

If the ECL Application Key is not suitable for the controller, a "cross" is displayed over the ECL Application Key-symbol.

Action:	Purpose:	Examples:
	Select language	
	Confirm	
	Select application	
	Confirm with 'Yes'	
	Set 'Time & Date' Turn and push the dial to select and change 'Hours', 'Minutes', 'Date', 'Month' and 'Year'. Choose "Next'	
	Confirm with 'Yes'	
	Go to 'Aut. daylight'	
	Choose whether 'Aut. daylight´ * should be active or not	YES or NO

* 'Aut. daylight' is the automatic changeover between summer and winter time.

Depending on the contents of the ECL Application Key, procedure A or B is taking place:

A
The ECL Application key contains factory settings:
The controller reads / transfers data from the ECL Application Key to ECL controller.

The application is installed, and the controller resets and starts up.

B
The ECL Application key contains changed system settings:
Push the dial repeatedly.

'NO': Only factory settings from the ECL Application Key will be copied to the controller.

'YES*: Special system settings (differing from the factory settings) will be copied to the controller.

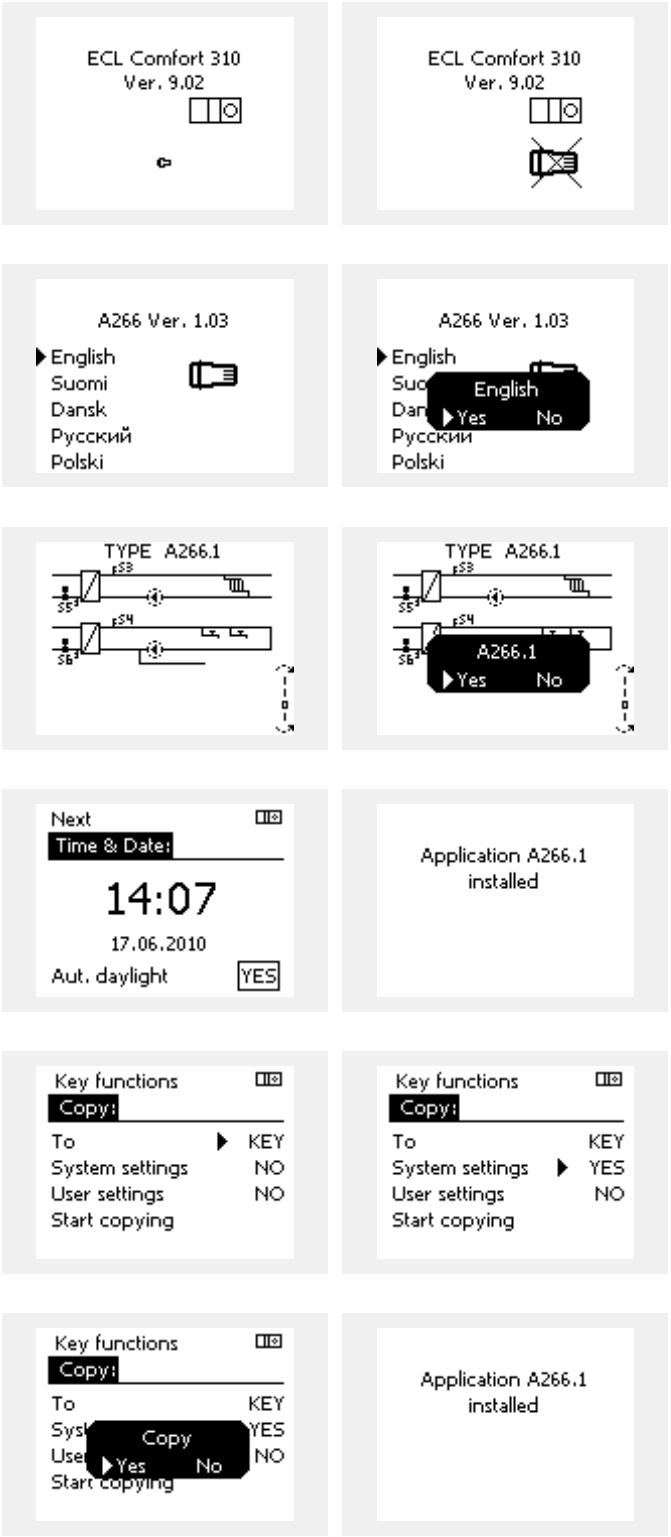
If the key contains user settings:
Push the dial repeatedly.

'NO: Only factory settings from the ECL Application Key will be copied to the controller.

'YES*: Special user settings (differing from the factory settings) will be copied to the controller.

* If 'YES' cannot be chosen, the ECL Application Key does not contain any special settings.

Choose 'Start copying' and confirm with 'Yes'.

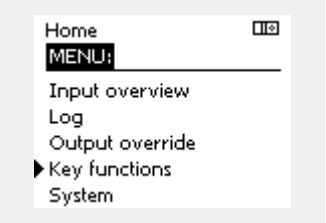


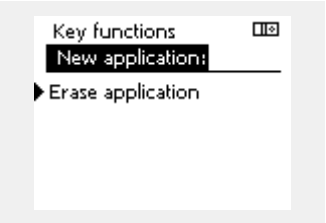
Application Key: Situation 2
The controller already runs an application. The ECL Application Key is inserted, but the application needs to be changed.

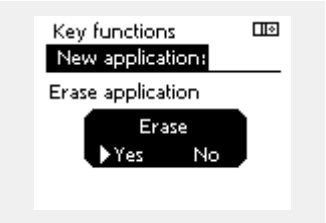
To change to another application on the ECL Application Key, the current application in the controller must be erased (deleted).

Be aware that the Application Key must be inserted.

Action:	Purpose:	Examples:
	Choose 'MENU' in any circuit	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose 'Common controller settings'	
	Confirm	
	Choose 'Key functions'	
	Confirm	
	Choose 'Erase application'	
	Confirm with 'Yes'	







The controller resets and is ready to be configured.

Follow the procedure described in situation 1.

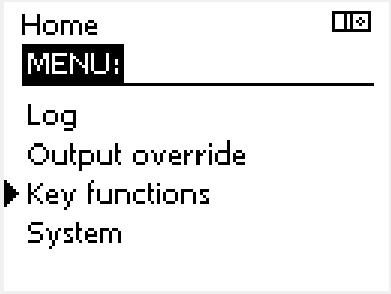
Application Key: Situation 3
A copy of the controllers settings is needed for configuring another controller.

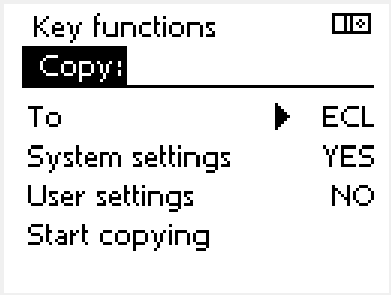
This function is used

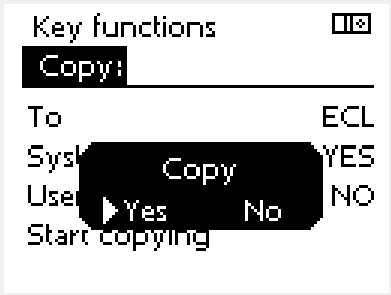
- for saving (backup) of special user and system settings
- when another ECL Comfort controller of the same type (210 or 310) must be configured with the same application but user / system settings differ from the factory settings.

How to copy to another ECL Comfort controller:

Action:	Purpose:	Examples:
	Choose 'MENU'	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose 'Common controller settings'	
	Confirm	
	Go to 'Key functions'	
	Confirm	
	Choose 'Copy'	
	Confirm	
	Choose 'To'. 'ECL' or 'KEY' will be indicated. Choose 'ECL' or KEY'	* 'ECL' or 'KEY'.
	Push the dial repeatedly to choose copy direction	
	Choose 'System settings' or 'User settings'	** 'NO' or 'YES'
	Push the dial repeatedly to choose 'Yes' or 'No' in 'Copy'. Push to confirm.	
	Choose 'Start copying'	
	The Application Key or the controller is updated with special system or user settings.	







*

'ECL': Data will be copied from the Application Key to the ECL Controller.
'KEY': Data will be copied from the ECL Controller to the Application Key.

**

'NO': The settings from the ECL controller will not be copied to the Application Key or to the ECL Comfort controller.
'YES': Special settings (differing from the factory settings) will be copied to the Application Key or to the ECL Comfort controller. If YES can not be chosen, there are no special settings to be copied.

2.6.2 ECL Application Key, copying data

General principles
When the controller is connected and operating, you can check and adjust all or some of the basic settings. The new settings can be stored on the Key.

How to update the ECL Application Key after settings have been changed?
All new settings can be stored on the ECL Application Key.

How to store factory setting in the controller from the Application Key?
Please read the paragraph concerning Application Key, Situation 1: The controller is new from the factory, the ECL Application Key is not inserted.

How to store personal settings from the controller to the Key?
Please read the paragraph concerning Application Key, Situation 3: A copy of the controllers settings is needed for configuring another controller

As a main rule, the ECL Application Key should always remain in the controller. If the Key is removed, it is not possible to change settings.

Factory settings can always be restored.

Make a note of new settings in the 'Settings overview' table.

Do not remove the ECL Application Key while copying. The data on the ECL Application Key can be damaged!

It is possible to copy settings from one ECL Comfort controller to another controller provided that the two controllers are from the same series (210 or 310).

2.7 Check list

Is the ECL Comfort controller ready for use?

- ☐ Make sure that the correct power supply is connected to terminals 9 (Live) and 10 (Neutral).
- ☐ Check that the required controlled components (actuator, pump etc.) are connected to the correct terminals.
- ☐ Check that all sensors / signals are connected to the correct terminals (see 'Electrical connections').
- ☐ Mount the controller and switch on the power.
- ☐ Is the ECL Application Key inserted (see 'Inserting the Application Key').
- ☐ Is the correct language chosen (see 'Language' in 'Common controller settings').
- ☐ Is the time & date set correctly (see 'Time & Date' in 'Common controller settings').
- ☐ Is the right application chosen (see 'Identifying the system type').
- ☐ Check that all settings in the controller (see 'Settings overview') are set or that the factory settings comply with your requirements.
- ☐ Choose manual operation (see 'Manual control'). Check that valves open and close, and that required controlled components (pump etc.) start and stop when operated manually.
- ☐ Check that the temperatures / signals shown in the display match the actual connected components.
- ☐ Having completed the manual operation check, choose controller mode (scheduled, comfort, saving or frost protection).

2.8 Navigation, ECL Application Key A361

Navigation, applications A361, circuit 1 and 2 (* application 361.2 only)

Home		Circuit 1, Heating		Circuit 2, Heating	
		ID no.	Function	ID no.	Function
MENU					
Schedule			Selectable		Selectable
Settings	Flow temperature		Heat curve		Heat curve
		11178	Temp. max.	11178	Temp. max.
		11177	Temp. min.	12177	Temp. min.
		11300	High supp. T X2*	12300	High supp. T X2*
		11301	High T max Y2*	12301	High T max Y2*
		11302	Low supply T X1*	12302	Low supply T X1*
		11303	Low T max Y1*	12303	Low T max Y1*
	Return limit	11031	High T out X1	12031	High T out X1
		11032	Low limit Y1	12032	Low limit Y1
		11033	Low T out X2	12033	Low T out X2
		11034	High limit Y2	12034	High limit Y2
		11035	Infl. - max.	12035	Infl. - max.
		11036	Infl. - min.	12036	Infl. - min.
		11037	Adapt. time	12037	Adapt. time
		11085	Priority	12085	Priority
	Flow / power limit		Actual		Actual
			Limit		Limit
		11119	High T out X1	12119	High T out X1
		11117	Low limit Y1	12117	Low limit Y1
		11118	Low T out X2	12118	Low T out X2
		11116	High limit Y2	12116	High limit Y2
		11112	Adapt. time	12112	Adapt. time
		11113	Filter constant	12113	Filter constant
		11109	Input type	12109	Input type
		11115	Units	12115	Units
	Optimization	11011	Auto saving	12011	Auto saving
		11012	Boost	12012	Boost
		11013	Ramp	12013	Ramp
		11014	Optimizer	12014	Optimizer
		11026	Pre stop	12026	Pre stop
		11021	Total stop	12021	Total stop
		11179	Cut-out	12179	Cut-out
	Control par.	11174	Motor pr.	12174	Motor pr.
		11184	Xp	12184	Xp
		11185	Tn	12185	Tn
		11186	M run	12186	M run
		11187	Nz	12187	Nz

Navigation, application A361, circuit 1 and circuit 2 continued

Home		Circuit 1, Heating		Circuit 2, Heating	
MENU		**ID no.**	**Function**	**ID no.**	**Function**
Settings	Pump control	11314	Chan.-over time	12314	Chan.-over time
		11310	Retry time	12310	Retry time
		11313	Stab. time	12313	Stab. time
		11311	Change, duration	12311	Change, duration
		11312	Change time	12312	Change time
		11022	P exercise	12022	P exercise
	Refill water		Pressure		Pressure
		11327	Input type	12327	Input type
		11323	Time-out	12323	Time-out
		11321	Pressure, des.	12321	Pressure, des.
		11322	Pressure, diff.	12322	Pressure, diff.
		11320	P exercise	12320	P exercise
		11325	Valve delay	12325	Valve delay
		11326	No. of pumps	12326	No. of pumps
	Application	11017	Demand offset		
		11023	M exercise	12023	M exercise
		11052	DHW priority	12052	DHW priority
		11077	P frost T	12077	P frost T
		11078	P heat T	12078	P heat T
		11093	Frost pr. T	12093	Frost pr. T
		11141	Ext. input	12141	Ext. input
		11142	Ext. mode	12142	Ext. mode
		11189	Min. act. time	12189	Min. act. time
Holiday			Selectable		Selectable
Alarm	Temp. monitor.	11147	Upper difference	12147	Upper difference
		11148	Lower difference	12148	Lower difference
		11149	Delay	12149	Delay
		11150	Lowest temp.	12150	Lowest temp.
	Clear alarm	11315	Circ. pumps	12315	Circ. pumps
		11324	Refill water	12324	Refill water
	Alarm overview		Selectable		Selectable
Influence overview	Des. flow T		Return lim.		Return lim.
			Flow / power lim.		Flow / power lim.
			Holiday		Holiday
			Ext. override		Ext. override
			Boost		Boost
			Ramp		Ramp
			Slave, demand		
			Heating cut-out		Heating cut-out
			DHW priority		DHW priority

Navigation, application A361, Common controller settings (* application A361.2 only)

Home		**Common controller settings**	
MENU		**ID no.**	**Function**
Time & Date			Selectable
Holiday			Selectable
Input overview 1			Outdoor T Supply T* Heat flow T Heat return T Static pressure S7 status
Input overview 2			Outdoor T Supply T* Heat flow T Heat return T Static pressure S8 status
Log 1 (sensors)	Outdoor T Supply T* Heating flow & des. Heat return T & limit Static pressure		Log today Log yesterday Log 2 days Log 4 days
Log 2 (sensors)	Outdoor T Supply T* Heating flow & des. Heat return T & limit Static pressure		Log today Log yesterday Log 2 days Log 4 days
Output override			M1, P1, P2, M2, P3, P5, V1, V2, P4, A1
Key functions	New application		Erase application
	Application		
	Factory setting		System settings User settings Go to factory
	Copy		To System settings User settings Start copying
	Key overview		
System	ECL version		Code no. Hardware Software Build no. Serial no. MAC Production week
	Extension		
	Ethernet		
	M-bus config		Selectable
	Energy Meters		Selectable
	Display	60058 60059	Backlight Contrast
	Communication	38 2048 2150 2151	Modbus addr. ECL 485 addr. Service pin Ext. reset
	Language	2050	Language

3.0 Daily use

3.1 How to navigate

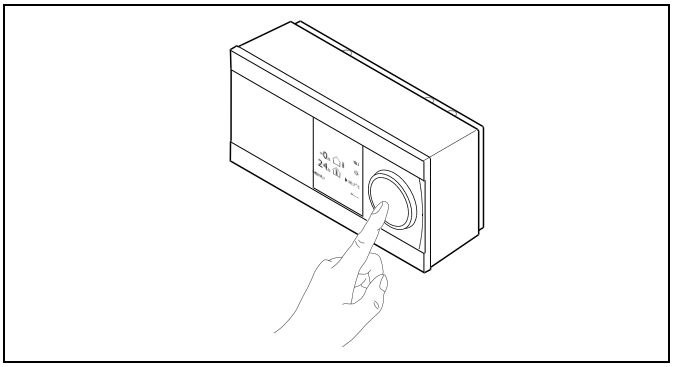
You navigate in the controller by turning the dial left or right to the desired position (↻).

The dial has a built-in accellerator. The faster you turn the dial, the faster it reaches the limits of any wide setting range.

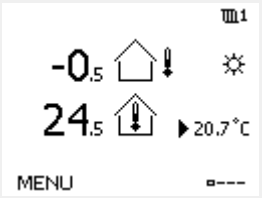
The position indicator in the display (▶) will always show you where you are.

Push the dial to confirm your choices (⏎).

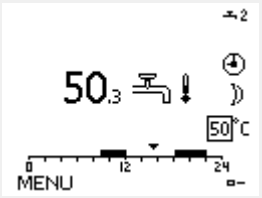
The display examples are from a two-circuit application: One heating circuit (🌡) and one domestic hot-water (DHW) circuit (🚿). The examples might differ from your application.



Heating circuit (🌡):



DHW circuit (🚿);



Some general settings which apply to the entire controller are located in a specific part of the controller.

To enter 'Common controller settings':

Action:	Purpose:	Examples:
↻	Choose 'MENU' in any circuit	MENU
⏎	Confirm	
↻	Choose the circuit selector at the top right corner in the display	
⏎	Confirm	
↻	Choose 'Common controller settings'	☐|○
⏎	Confirm	

Circuit selector

3.2 Understanding the controller display

Choosing a favorite display
Your favorite display is the display you have chosen as the default display. The favorite display will give you a quick overview of the temperatures or units that you want to monitor in general.

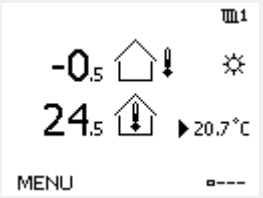
If the dial has not been activated for 20 min., the controller will revert to the overview display you have chosen as favorite.

Change between displays by turning the dial until you reach the display selector (▫---) at bottom right side of the display. Turn the dial and push to choose your favorite overview display.

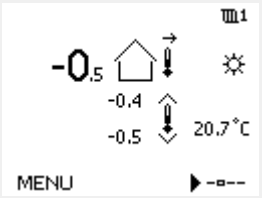
Heating circuit
Overview display 1 informs about:
actual outdoor temperature, controller mode,
actual room temperature, desired room temperature.

Overview display 2 informs about:
actual outdoor temperature, trend in outdoor temperature, controller mode, max. and min. outdoor temperatures since midnight as well as desired room temperature.

Overview display 1:



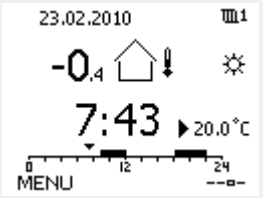
Overview display 2:



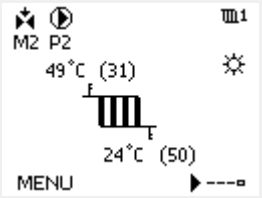
Overview display 3 informs about:
date, actual outdoor temperature, controller mode, time, desired room temperature as well as shows the comfort schedule of the current day.

Overview display 4 informs about:
state of the controlled components, actual flow temperature, (desired flow temperature), controller mode, return temperature (limitation value).

Overview display 3:



Overview display 4:



Dependent on the chosen display, the overview displays for the heating circuit inform you about:
- actual outdoor temperature (-0.5)
- controller mode (☼)
- actual room temperature (24.5)
- desired room temperature (20.7 °C)
- trend in outdoor temperature (→)
- min. and max. outdoor temperatures since midnight (◊)
- date (23.02.2010)
- time (7:43)
- comfort schedule of the current day (0 - 12 - 24)
- state of the controlled components (M2, P2)
- actual flow temperature (49 °C), (desired flow temperature (31))
- return temperature (24 °C) (limitation temperature (50))

The setting of the desired room temperature is important even if a room temperature sensor / Remote Control Unit is not connected.

If the temperature value is displayed as

"- -" the sensor in question is not connected.

"- - -" the sensor connection is short-circuited.

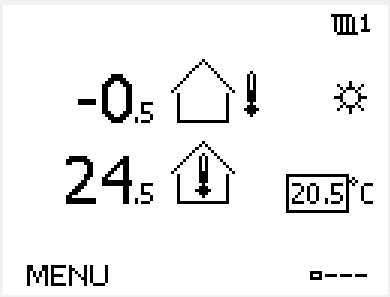
Setting the desired temperature

Depending on the chosen circuit and mode, it is possible to enter all daily settings directly from the overview displays (see also the next page concerning symbols).

Setting the desired room temperature

The desired room temperature can easily be adjusted in the overview displays for the heating circuit.

Action:	Purpose:	Examples:
	Desired room temperature	20.5
	Confirm	
	Adjust the desired room temperature	21.0
	Confirm	



This overview display informs about outdoor temperature, actual room temperature as well as desired room temperature.

The display example is for comfort mode. If you want to change the desired room temperature for saving mode, choose the mode selector and select saving.

The setting of the desired room temperature is important even if a room temperature sensor / Remote Control Unit is not connected.

Setting the desired room temperature, ECA 30 / ECA 31

The room desired temperature can be set exactly as in the controller. However, other symbols can be present in the display (please see 'What do the symbols mean?').

With the ECA 30 / ECA 31 you can override the desired room temperature set in the controller temporarily by means of the override functions:

3.3 What do the symbols mean?

Symbol	Description	
	Outdoor temp.	Temperature
	Room temp.	
	DHW temp.	
	Position indicator	
	Scheduled mode	Mode
	Comfort mode	
	Saving mode	
	Frost protection mode	
	Manual mode	
	Heating	Circuit
	DHW	
	Common controller settings	
	Pump ON	Controlled component
	Pump OFF	
	Actuator opens	
	Actuator closes	
	Alarm	
	Display selector	
	Max. and min. value	
	Trend in outdoor temperature	
	Wind speed sensor	

Symbol	Description
--	Sensor not connected or not used
---	Sensor connection short-circuited
	Fixed comfort day (holiday)
	Active influence
	No influence

Additional symbols, ECA 30 / 31:

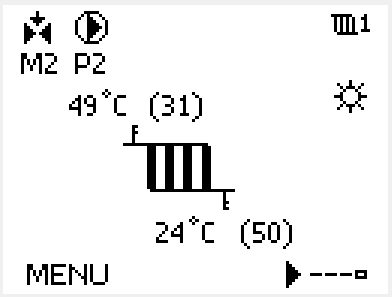
Symbol	Description
	ECA Remote Control Unit
	Relative humidity indoor
	Day off
	Holiday
	Relaxing (extended comfort period)
	Going out (extended saving period)

3.4 Monitoring temperatures and system components

Heating circuit

The overview display in the heating circuit ensures a quick overview of the actual and (desired) temperatures as well as the actual state of the system components.

Display example:

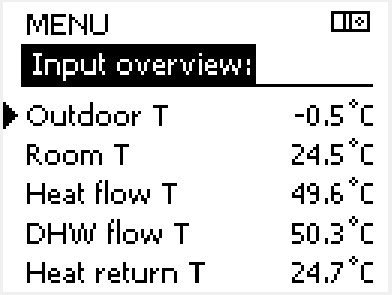


49 °C	Flow temperature
(31)	Desired flow temperature
24 °C	Return temperature
(50)	Return temperature limitation

Input overview

Another option to get a quick overview of measured temperatures is the 'Input overview' which is visible in the common controller settings (how to enter the common controller settings, see 'Introduction to common controller settings'.)

As this overview (see display example) only states the measured actual temperatures, it is read-only.



3.5 Manual control

It is possible to manually control the installed components.

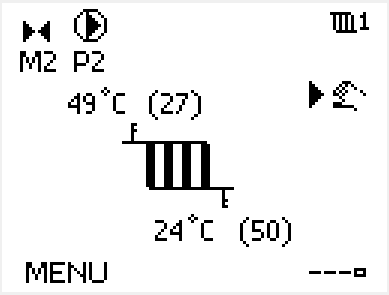
Manual control can only be selected in favorite displays in which the symbols for the controlled components (valve, pump etc.) are visible.

Action:	Purpose:	Examples:
	Choose mode selector	
	Confirm	
	Choose manual mode	
	Confirm	
	Choose pump	
	Confirm	
	Switch ON the pump	
	Switch OFF the pump.	
	Confirm pump mode	
	Choose motorized control valve	
	Confirm	
	Open the valve	
	Stop opening the valve	
	Close the valve	
	Stop closing the valve	
	Confirm valve mode	

To leave manual control, use the mode selector to select the desired mode. Push the dial.

Manual control is typically used when commisioning the installation. The controlled components, valve, pump etc., can be controlled for correct function.

Controlled components *Circuit selector*



During manual operation, all control functions are deactivated. Frost protection is not active.

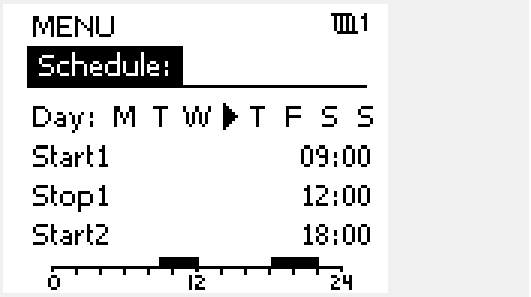
When manual control is selected for one circuit, it is automatically selected for all circuits!

3.6 Schedule

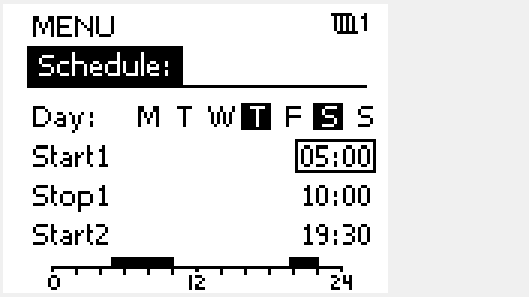
3.6.1 Set your schedule

The schedule consists of a 7-day week:

M = Monday
T = Tuesday
W = Wednesday
T = Thursday
F = Friday
S = Saturday
S = Sunday

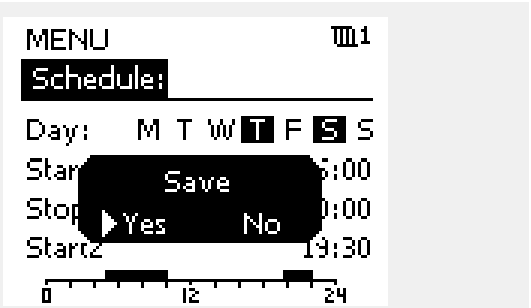


The schedule will day-by-day show you the start and stop times of your comfort periods (heating / DHW circuits).



Changing your schedule:

Action:	Purpose:	Examples:
	Choose 'MENU' in any of the overview displays	MENU
	Confirm	
	Confirm the choice 'Schedule'	
	Choose the day to change	▶
	Confirm*	T
	Go to Start1	
	Confirm	
	Adjust the time	
	Confirm	
	Go to Stop1, Start2 etc. etc.	
	Return to 'MENU'	MENU
	Confirm	
	Choose 'Yes' or 'No' in 'Save'	
	Confirm	



* Several days can be marked

The chosen start and stop times will be valid for all the chosen days (in this example Thursday and Saturday).

You can set max. 3 comfort periods a day. You can delete a comfort period by setting start and stop times to the same value.

Each circuit has its own schedule. To change to another circuit, go to 'Home', turn the dial and choose the desired circuit.

The start and stop times can be set in half-hourly (30 min.) intervals.

4.0 Settings overview

It is recommendable to make a note of any changed settings in the empty columns.

Setting	ID	Page	Factory settings in circuit(s)							
			1		2		3			
Heat curve		45								
Temp. max. (flow temp. limit, max.) — A361.1	11178	46	90 °C							
Temp. min. (flow temp. limit, min.)	11177	46	10 °C							
Heat curve		47								
Temp. max. (flow temp. limit, max.) — A361.2		48								
Temp. min. (flow temp. limit, min.)	11177	48	10 °C							
High supp. T X2 (high value of supply temp.) — A361.2	11300	48	150 °C							
High T max Y2 (high value of max limitation) — A361.2	11301	48	95 °C							
Low supply T X1(low value of supply temp.) — A361.2	11302	49	70 °C							
Low T max Y1 (low value of max limitation) — A361.2	11303	49	50 °C							
High T out X1 (return temp. limitation, high limit, X-axis)	11031	50	15 °C							
Low limit Y1 (return temp. limitation, low limit, Y-axis)	11032	50	40 °C							
Low T out X2 (return temp. limitation, low limit, X-axis)	11033	50	-15 °C							
High limit Y2 (return temp. limitation, high limit, Y-axis)	11034	51	60 °C							
Infl. - max. (return temp. limitation - max. influence)	11035	51	0.0							
Infl. - min. (return temp. limitation - min. influence)	11036	51	0.0							
Adapt. time (adaptation time)	11037	51	25 s							
Priority (priority for return temp. limitation)	11085	52	OFF							
High T out X1 (flow / power limitation, high limit, X-axis)	11119	53	15 °C							
Low limit Y1 (flow / power limitation, low limit, Y-axis)	11117	54	999.9 l/h							
Low T out X2 (flow / power limitation, low limit, X-axis)	11118	54	-15 °C							
High limit Y2 (flow / power limitation, high limit, Y-axis)	11116	54	999.9 l/h							
Adapt. time (adaptation time)	11112	54	OFF							
Filter constant	11113	54	10							
Input type	11109	55	OFF							
Units	11115	55	l/h							
Auto saving (saving temp. dependent on outdoor temp.)	11011	56	-15 °C							
Boost	11012	56	OFF							
Ramp (reference ramping)	11013	57	OFF							
Optimizer (optimizing time constant)	11014	57	OFF							
Pre-stop (optimized stop time)	11026	58	ON							
Total stop	11021	58	OFF							
Cut-out (limit for heating cut-out)	11179	59	20 °C							
Motor pr. (motor protection)	11174	60	OFF							
Xp (proportional band)	11184	60	80 K							
Tn (integration time constant)	11185	60	30 s							
M run (running time of the motorized control valve)	11186	60	50 s							
Nz (neutral zone)	11187	61	3 K							
Chan.-over time (change-over time)	11314	62	5 s							
Retry time	11310	62	20 m							
Stab. time (stabilization time)	11313	62	15 s							

Setting	ID	Page	Factory settings in circuit(s)							
			1		2		3			
Change, duration	11311	63	2							
Change time (changeover time)	11312	63	12							
P exercise (pump exercise)	11022	63	OFF							
Pressure		64								
Input type	11327	65	OFF							
Time-out	11323	65	20 s							
Pressure, des. (desired pressure)	11321	65	3.0 bar							
Pressure, diff. (switching difference)	11322	66	1.5 bar							
P exercise (pump exercise)	11320	66	OFF							
Valve delay	11325	66	1 s							
No. of pumps	11326	66	1							
Demand offset	11017	68	OFF							
M exercise (valve exercise)	11023	68	OFF							
DHW priority (closed valve / normal operation)	11052	68	OFF							
P frost T	11077	68	2 °C							
P heat T (heat demand)	11078	69	20 °C							
Frost pr. T (frost protection temperature)	11093	69	10 °C							
Ext. input (external override) — A361.1 / A361.2	11141	70	OFF							
Ext. mode (external override mode)	11142	70	SAVING							
Min. act. time (min. activation time gear motor)	11189	71	10							
Upper difference	11147	72	OFF							
Lower difference	11148	72	OFF							
Delay	11149	73	10 m							
Lowest temp.	11150	73	30 °C							
Circ. pumps	11315	73								
Refill water	11324	74								
Heat curve		75								
Temp. max. (flow temp. limit, max.) — A361.1	12178	76			90 °C					
Temp. min. (flow temp. limit, min.)	12177	76			10 °C					
Heat curve		77								
Temp. max. (flow temp. limit, max.) — A361.2		78								
Temp. min. (flow temp. limit, min.)	12177	78			10 °C					
High supp. T X2 (high value of supply temp.) — A361.2	12300	78			150 °C					
High T max Y2 (high value of max limitation) — A361.2	12301	78			95 °C					
Low supply T X1(low value of supply temp.) — A361.2	12302	79			70 °C					
Low T max Y1 (low value of max limitation) — A361.2	12303	79			50 °C					
High T out X1 (return temp. limitation, high limit, X-axis)	12031	80			15 °C					
Low limit Y1 (return temp. limitation, low limit, Y-axis)	12032	80			40 °C					
Low T out X2 (return temp. limitation, low limit, X-axis)	12033	80			-15 °C					
High limit Y2 (return temp. limitation, high limit, Y-axis)	12034	81			60 °C					
Infl. - max. (return temp. limitation - max. influence)	12035	81			0.0					
Infl. - min. (return temp. limitation - min. influence)	12036	81			0.0					
Adapt. time (adaptation time)	12037	81			25 s					
Priority (priority for return temp. limitation)	12085	82			OFF					

Setting	ID	Page	Factory settings in circuit(s) 1		2		3			
High T out X1 (flow / power limitation, high limit, X-axis)	12119	83			15 °C					
Low limit Y1 (flow / power limitation, low limit, Y-axis)	12117	84			999.9 l/h					
Low T out X2 (flow / power limitation, low limit, X-axis)	12118	84			-15 °C					
High limit Y2 (flow / power limitation, high limit, Y-axis)	12116	84			999.9 l/h					
Adapt. time (adaptation time)	12112	84			OFF					
Filter constant	12113	84			10					
Input type	12109	85			OFF					
Units	12115	85			l/h					
Auto saving (saving temp. dependent on outdoor temp.)	12011	86			-15 °C					
Boost	12012	86			OFF					
Ramp (reference ramping)	12013	87			OFF					
Optimizer (optimizing time constant)	12014	87			OFF					
Pre-stop (optimized stop time)	12026	88			ON					
Total stop	12021	88			OFF					
Cut-out (limit for heating cut-out)	12179	89			20 °C					
Motor pr. (motor protection)	12174	90			OFF					
Xp (proportional band)	12184	90			40 K					
Tn (integration time constant)	12185	90			20 s					
M run (running time of the motorized control valve)	12186	90			20 s					
Nz (neutral zone)	12187	91			3 K					
Chan.-over time (change-over time)	12314	93			5 s					
Retry time	12310	93			20 m					
Stab. time (stabilization time)	12313	93			15 s					
Change, duration	12311	94			2					
Change time (changeover time)	12312	94			12					
P exercise (pump exercise)	12022	94			OFF					
Pressure		95								
Input type	12327	96			OFF					
Time-out	12323	96			20 s					
Pressure, des. (desired pressure)	12321	96			3.0 bar					
Pressure, diff. (switching difference)	12322	97			1.5 bar					
P exercise (pump exercise)	12320	97			OFF					
Valve delay	12325	97			1 s					
No. of pumps	12326	97			1					
M exercise (valve exercise)	12023	99			OFF					
DHW priority (closed valve / normal operation)	12052	99			OFF					
P frost T	12077	99			2 °C					
P heat T (heat demand)	12078	99			20 °C					
Frost pr. T (frost protection temperature)	12093	100			10 °C					
Ext. input (external override) — A361.1 / A361.2	12141	100			OFF					
Ext. mode (external override mode)	12142	101			SAVING					
Min. act. time (min. activation time gear motor)	12189	101			3					
Upper difference	12147	102			OFF					
Lower difference	12148	102			OFF					

Setting	ID	Page	Factory settings in circuit(s)							
			1		2		3			
Delay	12149	103			10 m					
Lowest temp.	12150	103			30 °C					
Circ. pumps	12315	103								
Refill water	12324	104								
Backlight (display brightness)	60058	113							5	
Contrast (display contrast)	60059	113							3	
Modbus addr.	38	113							1	
ECL 485 addr. (master / slave address)	2048	114							15	
Service Pin	2150	114							0	
Ext. reset	2151	114							0	
Language	2050	114							English	

5.0 Settings, circuit 1

5.1 Flow temperature

5.1.1 A361.1

The ECL Comfort controller determines and controls the flow temperature related to the outdoor temperature. This relationship is called the heat curve.

The heat curve is set by means of 6 coordinate points. The desired flow temperature is set at 6 pre-defined outdoor temperature values.

The shown value for the heat curve is an average value (slope), based on the actual settings.

Outdoor temp.	Desired flow temp.			Your settings
	A	B	C	
-30 °C	45 °C	**75 °C**	95 °C	
-15 °C	40 °C	**60 °C**	90 °C	
-5 °C	35 °C	**50 °C**	80 °C	
0 °C	32 °C	**45 °C**	70 °C	
5 °C	30 °C	**40 °C**	60 °C	
15 °C	25 °C	**28 °C**	35 °C	

Adjust the desired flow temperature at -30, -15, -5, 0, 5, and 15 °C, if required.

A: Example for floor heating
B: Factory settings
C: Example for radiator heating (high demand)

Heat curve		
Circuit	*Setting range*	*Factory setting*
1	**Read-out only**	

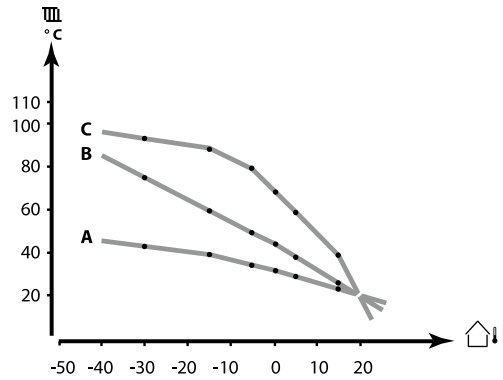
Push the dial to enter / change the coordinates of the heat curve.

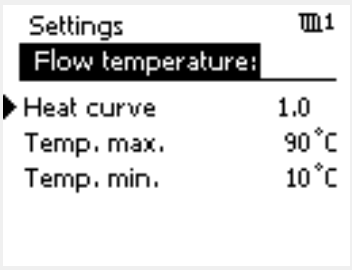
The heat curve represents the desired flow temperatures at different outdoor temperature and at a desired room temperature of 20 °C.

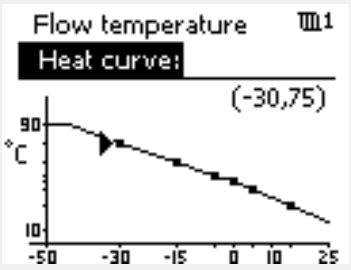
If the desired room temperature is changed, the desired flow temperature also changes:

(Desired room T - 20) × HC × 2.5
where "HC" is the Heat Curve slope and "2.5" is a constant.

Desired flow temperature







The calculated flow temperature can be influenced by the 'Boost' and 'Ramp' functions etc.

Example:

Heat curve:	1.0
Desired flow temp.:	50 °C
Desired room temp.:	22 °C
Calculation (22–20) × 1.0 × 2.5 =	5

Result:
The desired flow temperature will be corrected from 50 °C to 55 °C.

Max. limitation of the desired flow temperature:

In the application A361.1 the max. limitation value is selectable in 'Temp. max.'.

Temp. max. (flow temp. limit, max.) — A361.1		**11178**
Circuit	*Setting range*	*Factory setting*
1	**10 ... 150 °C**	**90 °C**

Set the max. flow temperature for the system. The desired flow temperature will not be higher than this setting. Adjust the factory setting, if required.

The setting for 'Temp. max.' has higher priority than 'Temp. min.'.

Temp. min. (flow temp. limit, min.)		**11177**
Circuit	*Setting range*	*Factory setting*
1	**10 ... 150 °C**	**10 °C**

Set the min. flow temperature for the system. The desired flow temperature will not be lower than this setting. Adjust the factory setting, if required.

'Temp. min.' is overruled if 'Total stop' is active in Saving mode or 'Cut-out' is active.
'Temp. min.' can be overruled by the influence from the return temperature limitation (see 'Priority').

The setting for 'Temp. max.' has higher priority than 'Temp. min.'.

5.1.2 A361.2

The ECL Comfort controller determines and controls the flow temperature related to the supply temperature (S2). This relationship is set in the controller.

The heat curve is set in all coordinate points to the max. desired flow temperature (150 °C). The desired flow temperature will always be in relation to the supply temperature (S2).

The shown value for the heat curve is an average value (slope), based on the actual settings.

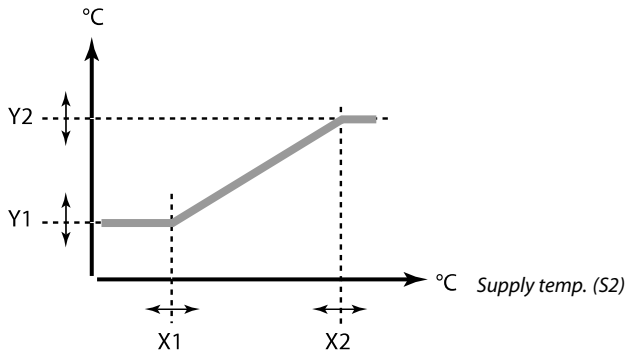
Outdoor temp.	Factory setting	Your settings
-30 °C	**150 °C**	
-15 °C	**150 °C**	
-5 °C	**150 °C**	
0 °C	**150 °C**	
5 °C	**150 °C**	
15 °C	**150 °C**	

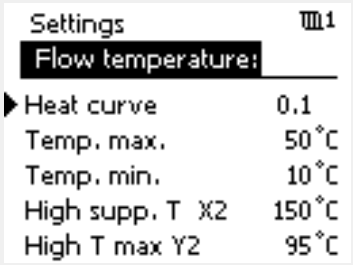
Adjust the desired flow temperature at -30, -15, -5, 0, 5, and 15 °C, if required.

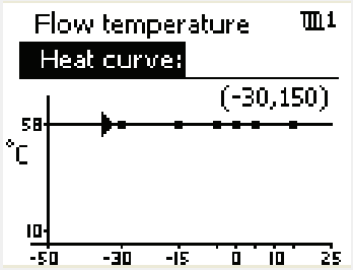
Heat curve		
Circuit	*Setting range*	*Factory setting*
1	**Read-out only**	

The factory setting (a general desired flow temperature of 150 °C) is limited to a max. value based on the supply temperature (S2) and the settings in parameters 'High supp. T X2', 'High T max Y2', 'Low supply T X1' and 'Low T max Y1'.

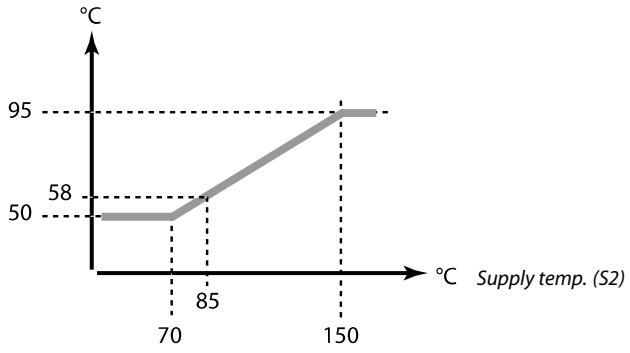
Desired flow temperature







Desired flow temperature



The above heat curve is an example of a supply temperature (S2) of 85 °C. The desired flow temperature (58 °C) is based on the set-up of the relationship between the supply temperature (S2) and the desired flow temperature.

Max. limitation of the desired flow temperature:

In the application A361.2 the desired flow temperature or max. limitation value depends on the supply temperature (S2). The relationship is set in the four settings 'High supp. T X2', 'High T max Y2', 'Low supply T X1' and 'Low T max Y1'.

When setting the heat curve coordinates as described in the section 'A361.1', the desired flow temperature can be limited to a maximum according to the supply temperature (S2).

Temp. max. (flow temp. limit, max.) — A361.2		
Circuit	*Setting range*	*Factory setting*
1	**Read-out only**	

The supply temperature (S2) determines the desired flow temperature. The value is calculated on basis of the settings in the following parameters: 'High supp. T X2', 'High T max Y2', 'Low supply T X1' and 'Low T max Y1'.

Temp. min. (flow temp. limit, min.)		**11177**
Circuit	*Setting range*	*Factory setting*
1	**10 ... 150 °C**	**10 °C**

Set the min. flow temperature for the system. The desired flow temperature will not be lower than this setting. Adjust the factory setting, if required.

'Temp. min.' is overruled if 'Total stop' is active in Saving mode or 'Cut-out' is active.
'Temp. min.' can be overruled by the influence from the return temperature limitation (see 'Priority').

The setting for 'Temp. max.' has higher priority than 'Temp. min.'.

High supp. T X2 (high value of supply temp.) — A361.2		**11300**
Circuit	*Setting range*	*Factory setting*
1	**10 ... 150 °C**	**150 °C**

Set the high value for the supply temperature in relation to the desired max. flow temperature. When the supply temperature is above the set value, the max. limitation of the flow temperature is the Y2 value. When the supply temperature is below the set value, the max. limitation of the flow temperature will be lower.

High T max Y2 (high value of max limitation) — A361.2		**11301**
Circuit	*Setting range*	*Factory setting*
1	**10 ... 150 °C**	**95 °C**

Set the high value for the max. limitation of the desired flow temperature.

Low supply T X1 (low value of supply temp.) — A361.2		11302
Circuit	*Setting range*	*Factory setting*
1	**10 ... 150 °C**	**70 °C**

Set the low value for the supply temperature in relation to the desired max. flow temperature. When the supply temperature is below the set value, the max. limitation of the flow temperature is the Y1 value. When the supply temperature is above the set value, the max. limitation of the flow temperature will be higher.

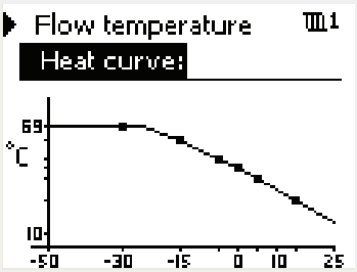
Low T max Y1 (low value of max limitation) — A361.2		11303
Circuit	*Setting range*	*Factory setting*
1	**10 ... 150 °C**	**50 °C**

Set the low value for the max. limitation of the desired flow temperature.

Set-up procedure when the supply temperature (S2) has to limit the desired flow temperature to a maximum:

1. Choose 'Heat curve'.
2. Set the desired flow temperature in all 6 coordinates (-30 °C, -15 °C etc.) to the desired values.

Result:
The desired flow temperature will be in relation to the outdoor temperature but will be limited to a maximum according the settings in 'High supp. T X2', 'High T max Y2', 'Low supply T X1' and 'Low T max Y1'.



The example shows the max. limitation of the desired flow temperature when the supply temperature (S2) is 105 °C.

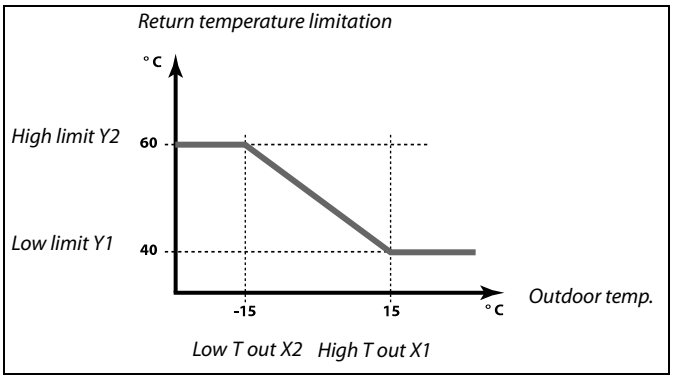
5.2 Return limit

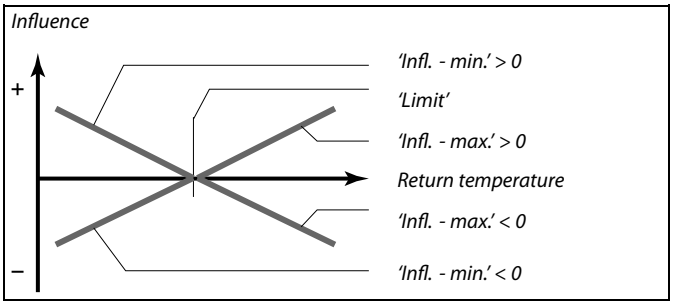
The return temperature limitation is based on the outdoor temperature. Typically in district heating systems a higher return temperature is accepted at a decrease in outdoor temperature. The relationship between the return temperature limits and outdoor temperature is set in two coordinates.

The outdoor temperature coordinates are set in 'High T out X1' and 'Low T out X2'. The return temperature coordinates are set in 'High limit Y2' and 'Low limit Y1'.

The controller automatically changes the desired flow temperature to obtain an acceptable return temperature when the return temperature falls below or gets higher than the calculated limit.

This limitation is based on a PI regulation where P ('Infl.' factor) responds quickly to deviations and I ('Adapt. time') responds slower and over time removes the small offsets between the desired and actual values. This is done by changing the desired flow temperature.





If the 'Infl.' factor is too high and / or the 'Adapt. time' too low, there is a risk of unstable control.

High T out X1 (return temp. limitation, high limit, X-axis)		**11031**
Circuit	*Setting range*	*Factory setting*
1	**-60 ... 20 °C**	**15 °C**
Set the outdoor temperature for the low return temperature limitation.		

The corresponding Y coordinate is set in 'Low limit Y1'.

Low limit Y1 (return temp. limitation, low limit, Y-axis)		**11032**
Circuit	*Setting range*	*Factory setting*
1	**10 ... 150 °C**	**40 °C**
Set the return temperature limitation referring to the outdoor temperature set in 'High T out X1'.		

The corresponding X coordinate is set in 'High T out X1'.

Low T out X2 (return temp. limitation, low limit, X-axis)		**11033**
Circuit	*Setting range*	*Factory setting*
1	**-60 ... 20 °C**	**-15 °C**
Set the outdoor temperature for the high return temperature limitation.		

The corresponding Y coordinate is set in 'High limit Y2'.

High limit Y2 (return temp. limitation, high limit, Y-axis)		11034
Circuit	*Setting range*	*Factory setting*
1	**10 ... 150 °C**	**60 °C**
Set the return temperature limitation referring to the outdoor temperature set in 'Low T out X2'.		

The corresponding X coordinate is set in 'Low T out X2'.

Infl. - max. (return temp. limitation - max. influence)		11035
Circuit	*Setting range*	*Factory setting*
1	**-9.9 ... 9.9**	**0.0**
Determines how much the desired flow temperature will be influenced if the return temperature is higher than the calculated limit.		

Influence higher than 0:
The desired flow temperature is increased, when the return temperature gets higher than the calculated limit.

Influence lower than 0:
The desired flow temperature is decreased, when the return temperature gets higher than the calculated limit.

Example
The return limit is active above 50 °C.
The influence is set to -2.0.
The actual return temperature is 2 degrees too high.
Result:
The desired flow temperature is changed by -2.0 x 2 = -4.0 degrees.

Normally, this setting is lower than 0 in district heating systems to avoid a too high return temperature.
Typically, this setting is 0 in boiler systems because a higher return temperature is acceptable (see also 'Infl. - min.').

Infl. - min. (return temp. limitation - min. influence)		11036
Circuit	*Setting range*	*Factory setting*
1	**-9.9 ... 9.9**	**0.0**
Determines how much the desired flow temperature will be influenced if the return temperature is lower than the calculated limit.		

Influence higher than 0:
The desired flow temperature is increased, when the return temperature gets below the calculated limit.

Influence lower than 0:
The desired flow temperature is decreased, when the return temperature gets below the calculated limit.

Example
The return limit is active below 50 °C.
The influence is set to -3.0.
The actual return temperature is 2 degrees too low.
Result:
The desired flow temperature is changed by -3.0 x 2 = -6.0 degrees.

Normally, this setting is 0 in district heating systems because a lower return temperature is acceptable.
Typically, this setting is higher than 0 in boiler systems to avoid a too low return temperature (see also 'Infl. - max.').

Adapt. time (adaptation time)		11037
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 50 s**	**25 s**
Controls how fast the return temperature adapts to the desired return temperature limit (I control).		

The adaptation function can correct the desired flow temperature with max. 8 K.

OFF: The control function is not influenced by the 'Adapt. time'.

1: The desired temperature is adapted quickly.

50: The desired temperature is adapted slowly.

Priority (priority for return temp. limitation)		**11085**
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	**OFF**
Choose whether the return temperature limitation should overrule the set min. flow temperature 'Temp. min.'.		

ON: The min. flow temperature limit is overruled.

OFF: The min. flow temperature limit is not overruled.

5.3 Flow / power limit

A flow or energy meter can be connected to the ECL controller in order to limit the flow or consumed power. The signal from the flow or energy meter is based on M-bus signal.

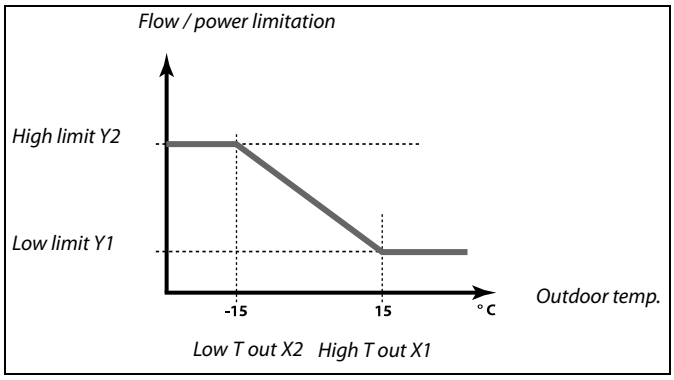
The flow / power limitation can be based on the outdoor temperature. Typically, in district heating systems a higher flow or power is accepted at lower outdoor temperatures.

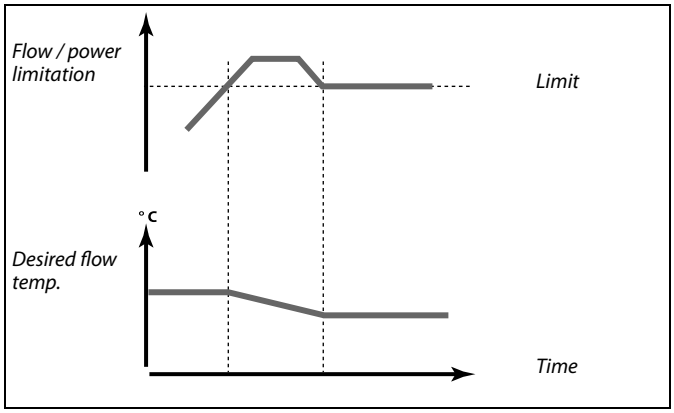
The relationship between the flow or power limits and the outdoor temperature is set in two coordinates.

The outdoor temperature coordinates are set in 'High T out X1' and 'Low T out X2'.

The flow or power coordinates are set in 'Low limit Y1' and 'High limit Y2'. Based on these settings, the controller calculates the limitation value.

When the flow / power gets higher than the calculated limit, the controller gradually reduces the desired flow temperature to obtain an acceptable max. flow or power consumption.





If the 'Adapt. time' is too high, there is a risk of unstable control.

Actual (actual flow or power)		**11110**
Circuit	*Setting range*	*Factory setting*
1	**Read-out only**	
The value is the actual flow or power based on the signal from flow / energy meter, converted in the controller.		

Limit (limitation value)		**11111**
Circuit	*Setting range*	*Factory setting*
1	**Read-out only**	
The value is the calculated limitation value.		

High T out X1 (flow / power limitation, high limit, X-axis)		**11119**
Circuit	*Setting range*	*Factory setting*
1	**-60 ... 20 °C**	**15 °C**
Set the outdoor temperature for the low flow / power limitation.		

The corresponding Y coordinate is set in 'Low limit Y1'.

Low limit Y1 (flow / power limitation, low limit, Y-axis)		11117
Circuit	*Setting range*	*Factory setting*
1	**0.0 ... 999.9 l/h**	**999.9 l/h**
Set the flow / power limitation referring to the outdoor temperature set in 'High T out X1'.		

The corresponding X coordinate is set in 'High T out X1'.

Low T out X2 (flow / power limitation, low limit, X-axis)		11118
Circuit	*Setting range*	*Factory setting*
1	**-60 ... 20 °C**	**-15 °C**
Set the outdoor temperature for the high flow / power limitation.		

The corresponding Y coordinate is set in 'High limit Y2'.

High limit Y2 (flow / power limitation, high limit, Y-axis)		11116
Circuit	*Setting range*	*Factory setting*
1	**0.0 ... 999.9 l/h**	**999.9 l/h**
Set the flow / power limitation referring to the outdoor temperature set in 'Low T out X2'.		

The corresponding X coordinate is set in 'Low T out X2'.

Adapt. time (adaptation time)		11112
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 50 s**	**OFF**
Controls how fast the flow / power limitation adapts to the desired limitation.		

OFF: The control function is not influenced by the 'Adapt. time'.

1: The desired temperature is adapted slowly.

50: The desired temperature is adapted quickly.

Filter constant		11113
Circuit	*Setting range*	*Factory setting*
1	**1 ... 50**	**10**
The actual filter dampens the flow / power input data by the set factor.		

1: No filtering.

2: Fast (low filter constant)

50: Slow (high filter constant)

The limitation function can overrule the set 'Temp. min' of the desired flow temperature.

Input type		11109
Circuit	*Setting range*	*Factory setting*
1	**OFF / EM1 ... EM5**	**OFF**
Choice of M-bus signal from energy meter number 1 ... 5.		

OFF: No M-bus signal acquired.

EM1 ... EM5: Energy meter number.

Units		11115
Circuit	*Setting range*	*Factory setting*
1	**See the list**	**l/h**
Choice of units for measured values.		

Flow values are expressed as l/h or m^3/h
Power values are expressed as kW, MW or GW.

List for setting range of 'Units':
l/h
m^3/h
kW
MW
GW

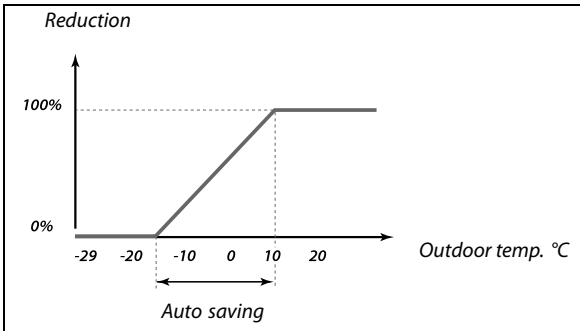
5.4 Optimization

Auto saving (saving temp. dependent on outdoor temp.)		11011
Circuit	*Setting range*	*Factory setting*
1	**OFF / -29 ... 10 °C**	**-15 °C**
Below the set value for the outdoor temperature, the saving temperature setting has no influence. Above the set value for the outdoor temperature, the saving temperature relates to the actual outdoor temperature. The function is relevant in district heating installations in order to avoid a big change in the desired flow temperature after a saving period.		

OFF: The saving temperature does not depend on the outdoor temperature.

-29 ... 10: The saving temperature depends on the outdoor temperature. When the outdoor temperature is above 10 °C, the reduction is 100%. The lower the outdoor temperature, the less the temperature reduction. When the outdoor temperature is below the set limit, there is no temperature reduction.

The comfort and the saving temperatures are set in the display overviews. The difference between the comfort and the saving temperature is considered to be 100%. Depending on the outdoor temperature, the percentage value can be lower according to the set value in 'Auto saving'.



Example:

Outdoor temp.:	–5 °C
Desired room temp. in Comfort mode:	22 °C
Desired room temp. in Saving mode:	16 °C
Setting in 'Auto saving':	–15 °C

The drawing above illustrates that the reduction percentage at an outdoor temperature of –5 °C is 40%.

The difference between Comfort and Saving temperature is (22–16) = 6 degrees.

40% of 6 degrees = 2.4 degrees

The 'Auto saving' temperature is corrected to (22–2.4) = 19.6 °C.

Boost		11012
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 99%**	**OFF**
Shortens the heating-up period by increasing the desired flow temperature by the percentage you set.		

OFF: The boost function is not active.

1-99%: The desired flow temperature is increased temporarily with the set percentage.

In order to shorten the heating-up period after a saving temperature period, the desired flow temperature can be increased temporarily (max. 1 hour). At optimizing the boost is active in the optimization period ('Optimizer').

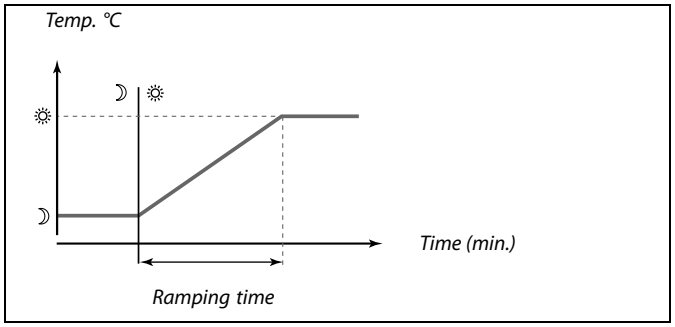
If a room temperature sensor or an ECA 30 / 31 is connected, the boost stops when the room temperature is reached.

Ramp (reference ramping)		11013
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 99 m**	**OFF**
The time (minutes) in which the desired flow temperature increases gradually to avoid load peaks in the heat supply.		

OFF: The ramping function is not active.

1-99 m: The desired flow temperature is increased gradually with the set minutes.

In order to avoid load peaks in the supply network, the flow temperature can be set to increase gradually after a period with saving temperature. This causes the valve to open gradually.



Optimizer (optimizing time constant)		11014
Circuit	*Setting range*	*Factory setting*
1	**OFF / 10 ... 59**	**OFF**
Optimizes the start and stop times for the comfort temperature period to obtain the best comfort at the lowest energy consumption. *The lower the outdoor temperature, the earlier the heating cut-in. The lower the outdoor temperature, the later the heating cut-out.* *The optimized heating cut-out time can be automatic or disabled. The calculated start and stop times are based on the setting of the optimizing time constant.*		

Adjust the optimizing time constant.

The value consists of a two digit number. The two digits have the following meaning (digit 1 = Table I, digit 2 = Table II).

OFF: No optimization. The heating starts and stops at the times set in the schedule.

10 ... 59: See tables I and II.

Table I:

Left digit	Heat accumulation of the building	System type
1-	light	Radiator systems
2-	medium	
3-	heavy	
4-	medium	Floor heating systems
5-	heavy	

Table II:

Right digit	Dimensioning temperature	Capacity
-0	-50 °C	large
-1	-45 °C	·
·	·	·
-5	-25 °C	normal
·	·	·
-9	-5 °C	small

Dimensioning temperature:
The lowest outdoor temperature (usually determined by your system designer in connection with the design of the heating system) at which the heating system can maintain the designed room temperature.

Example
The system type is radiator, and the heat accumulation of the building is medium.
The left digit is 2.
The dimensioning temperature is -25 °C, and the capacity is normal.
The right digit is 5.

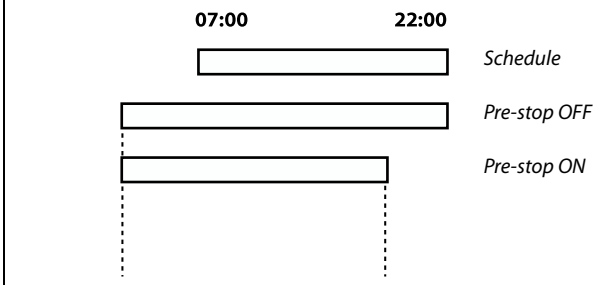
Result:
The setting is to be changed to 25.

Pre-stop (optimized stop time)		**11026**
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	**ON**
Disable the optimized stop time.		

OFF: The optimized stop time is disabled.

ON: The optimized stop time is enabled.

Example: Optimization of Comfort from 07:00 - 22:00

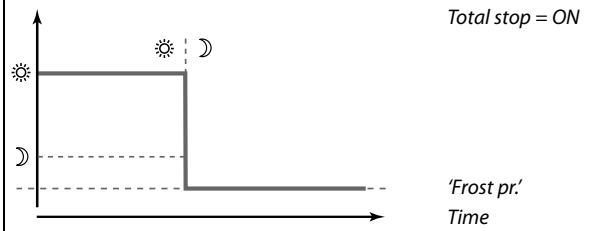


Total stop		**11021**
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	**OFF**
Decide whether you want a total stop during the saving temperature period.		

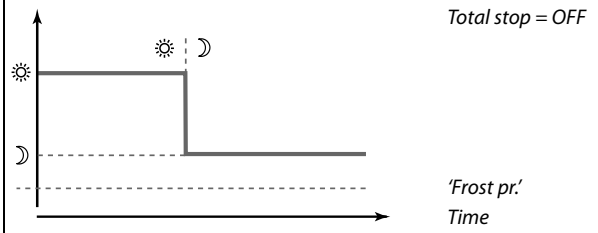
OFF: No total stop. The desired flow temperature is reduced according to:
- desired room temperature in saving mode
- auto saving

ON: The desired flow temperature is lowered to the set value in 'Frost pr.' The circulation pump is stopped but frost protection is still active, see 'P frost T'.

Desired flow temp. °C



Desired flow temp. °C



The min. flow temperature limitation ('Temp. min.') is overruled when 'Total stop' is ON.

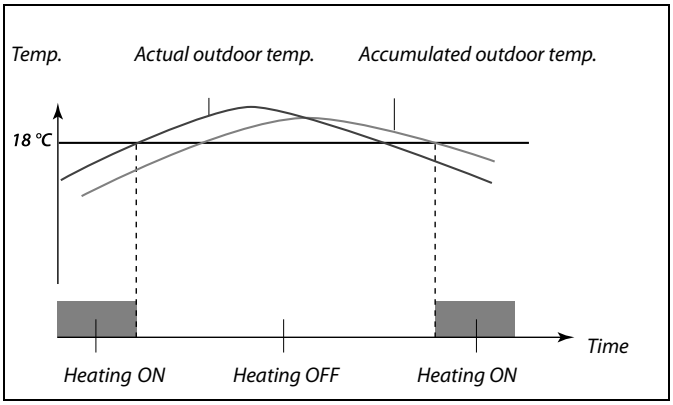
Cut-out (limit for heating cut-out)		11179
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 50 °C**	**20 °C**

The heating can be switched OFF when the outdoor temperature is higher than the set value. The valve closes and after the post-run time, the heating circulation pump stops. 'Temp. min.' will be overruled.

The heating system switches ON again when the outdoor temperature and the accumulated (filtered) outdoor temperature become lower than the set limit.

This function can save energy.

Set the value for outdoor temperature at which you want the heating system to switch OFF.



The heating cut-out is only active when the controller mode is in scheduled operation. When the cut-out value is set to OFF, there is no heating cut-out.

5.5 Control parameters

Motor pr. (motor protection)		11174
Circuit	*Setting range*	*Factory setting*
1	**OFF / 10 ... 59 m**	**OFF**
Prevents the controller from unstable temperature control (and resulting actuator oscillations). This can occur at very low load. The motor protection increases the lifetime of all involved components.		

OFF: Motor protection is not activated.

10 ... 59: Motor protection is activated after the set activation delay in minutes.

Recommended for heating systems with variable load.

Xp (proportional band)		11184
Circuit	*Setting range*	*Factory setting*
1	**5 ... 250 K**	**80 K**

Set the proportional band. A higher value will result in a stable but slow control of the flow temperature.

Tn (integration time constant)		11185
Circuit	*Setting range*	*Factory setting*
1	**1 ... 999 s**	**30 s**

Set a high integration time constant (in seconds) to obtain a slow but stable reaction to deviations.

A low integration time constant will make the controller react fast but with less stability.

M run (running time of the motorized control valve)		11186
Circuit	*Setting range*	*Factory setting*
1	**5 ... 250 s**	**50 s**

'M run' is the time in seconds it takes the controlled component to move from fully closed to fully open position. Set the 'M run' according to the examples or measure the running time by means of a stop watch.

How to calculate the running time of a motorized control valve
The running time of the motorized control valve is calculated using the following methods:

Seated valves

Running time = Valve stroke (mm) x actuator speed (sec. / mm)

Example: 5.0 mm x 15 sec. / mm = 75 sec.

Rotating valves

Running time = Turning degrees x actuator speed (sec. / degr.)

Example: 90 degr. x 2 sec. / degr. = 180 sec.

Nz (neutral zone)		11187
Circuit	*Setting range*	*Factory setting*
1	**1 ... 9 K**	**3 K**

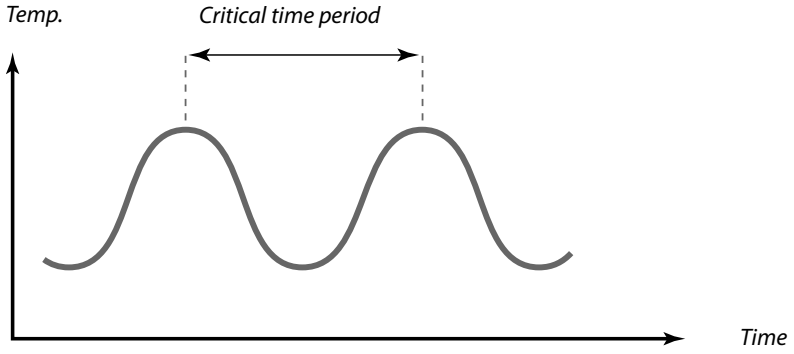
Set the acceptable flow temperature deviation.

Set the neutral zone to a high value if you can accept a high variation in flow temperature. When the actual flow temperature is within the neutral zone, the controller does not activate the motorized control valve.

The neutral zone is symmetrical around the desired flow temperature value, i.e. half the value is above and half the value is below this temperature.

If you want to tune the PI regulation precisely, you can use the following method:

- Set the 'Tn' (integration time constant) to its max. value (999 sec.).
- Decrease the value for the 'Xp' (proportional band) until the system starts hunting (i.e. gets unstable) with a constant amplitude (it might be necessary to force the system by setting an extreme low value).
- Find the critical time period on the temperature recorder or use a stop watch.



This critical time period will be characteristic for the system, and you can evaluate the settings from this critical period.

'Tn' = 0.85 x critical time period

'Xp' = 2.2 x proportional band value in the critical time period

If the regulation seems to be too slow, you can decrease the proportional band value by 10%. Make sure there is a consumption when you set the parameters.

5.6 Pump control

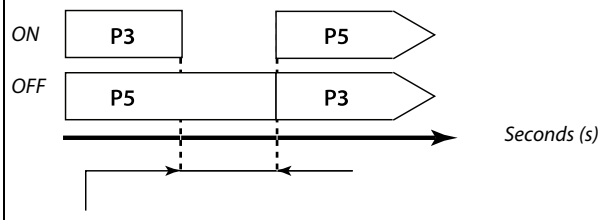
This application can operate with one or two circulation pumps. When operating with two circulation pumps, the pumps are controlled alternately, according to a time set-up. When a pump is switched ON the controller is waiting for differential pressure (S7 for heating circuit, S8 for DHW circuit) to build up. If differential pressure is not achieved, an alarm is generated and the ECL Comfort controller switches ON the other pump.

If none of the pumps can come into operation (detected by means of the differential pressure switch), the alarm is activated and the motorized control valve closes (a safety function).

Chan.-over time (change-over time)		**11314**
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 99 s**	**5 s**
Setting of time to elapse between the pump stop command for one pump and the start command for the other pump. The change-over time can ensure that a pump is stopped efficiently before the other pump starts.		

OFF: One circulation pump in the application.

1 ... 99: Time for change-over.



'Chan.-over time'

'Chan.-over time' has to be chosen in systems with two pumps.

Retry time		**11310**
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1... 99 m**	**20 m**
If an alarm has been generated for the pump or alarms have been generated for both pumps, this setting will determine the time between the time of the alarm and the retry time for repeated pump start.		

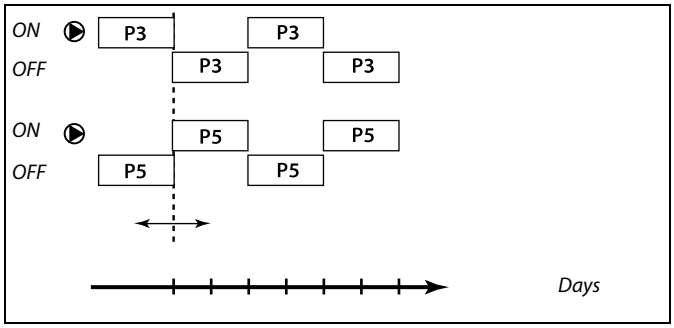
OFF: No retry time required after an alarm. The pump or pumps in question will not be restarted.

1 ... 99: After an alarm, the pump or pumps will be restarted after the set time.

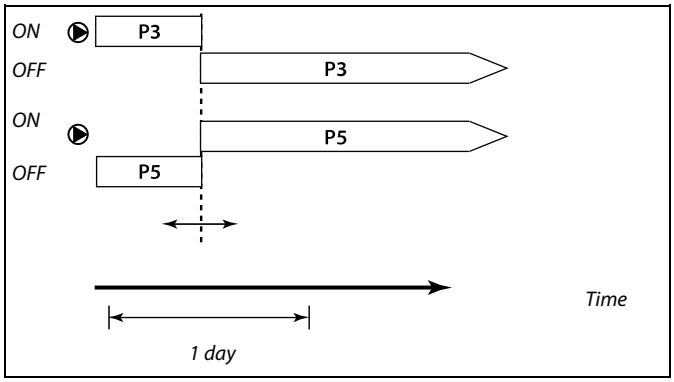
Stab. time (stabilization time)		**11313**
Circuit	*Setting range*	*Factory setting*
1	**1... 99 s**	**15 s**
Setting of max. time to elapse between pump start command and feedback from differential pressure switch. If the differential pressure switch does not give feedback within the set time, the alarm will be activated and the other pump will get a start command.		

If the chosen stabilization time ('Stab. time') is too short, the active pump will stop immediately after the stabilization time has elapsed.

Change, duration		11311
Circuit	*Setting range*	*Factory setting*
1	**1 ... 10**	**2**
The number of days between shift of circulation pumps. The shift takes place at the time set in 'Change time'.		



Change time (changeover time)		11312
Circuit	*Setting range*	*Factory setting*
1	**0 ... 23**	**12**
The exact time of the day, where the shift must take place. The day is divided into 24 hours. The factory setting here is 12 which means 12:00 (noon).		



P exercise (pump exercise)		11022
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 200 s**	**OFF**
The time the pump is activated during exercise. Exercise takes place every day (at 12:20) when no heat demand has been present.		

OFF: No pump exercise.

1 ... 200: Activation time during exercise.

The feedback from the differential pressure switch is active and will activate the alarm in case that the pump does not start.

The status of the differential pressure switch is shown in 'Input overview'.

Example:

S7 status . . . OFF / ON

OFF: The differential pressure switch is closed (differential pressure is OK)

ON: The differential pressure switch is open (differential pressure is not OK)

5.7 Refill water

Leaks on the consumers side will result in falling static pressure and thereby a poor supply of heating. A refill water function can inject water to increase the static pressure.

This application can monitor the static pressure and enable the refill water function when the pressure is too low.

The pressure is measured by means of a pressure transmitter (giving a 0 - 10 volt signal in relation to the measured pressure) or a pressure switch.

When a pressure transmitter signal is used, two settings in the controller represent pressure setpoint and difference.

When a pressure switch signal is used, the setpoint and (maybe) the switching difference is set on the pressure switch.

When a too low pressure is detected the refill water pump is switched ON and, after a set time, the ON-OFF valve is activated.

If the pressure is not achieved within a set time, an alarm is generated. The ECL Comfort controller switches OFF the circulation pumps after 60 seconds and the control valve closes (a safety function).

Pressure		
Circuit	*Setting range*	*Factory setting*
1	**Read-out only**	

The read-out can be a value (in bar):

- The pressure is measured by means of a pressure transmitter. The transmitter sends the measured pressure as a 0-10 V or a 4-20 mA signal. The voltage signal can be applied directly to input S10. A current signal is converted by means of a resistor to a voltage and then applied to input S10. The measured voltage on input S10 must be converted to a pressure value by the controller. This procedure sets up the scaling.

  Push the dial to see the graph and enter the value sets for the input voltage (1 and 10 volt) and displayed pressure (in bar).

  Pressure: 0.0 ... 30.0 bar

  Fixed voltage settings: 1 V and 10 V

  Factory settings: (1.0,0) and (10,20.0)

  This means that the 'Pressure' is 0.0 bar at 1 V and 20.0 bar at 10 V.

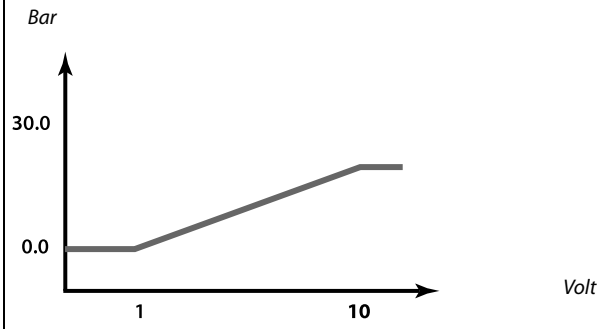
  Typically, the higher the voltage, the higher the displayed pressure.

Or the read-out can be OFF or ON:

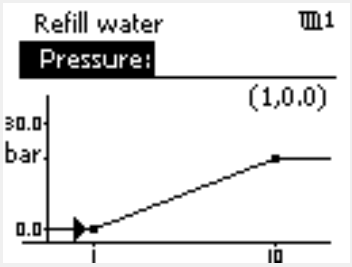
- The pressure is measured by means of a pressure switch. The pressure switch has an open contact when measuring a too low pressure (shown as OFF). When measured pressure is OK, the contact is closed (shown as ON).

  The pressure switch contact (potential free) is connected directly to input S10.

Example: Relationship between input voltage and displayed pressure (in bar)



This example shows that 1 volt correspond to 0.0 bar and 10 volt correspond to 20.0 bar



This scaling menu is always shown, regardless whether a pressure transmitter or a pressure switch is used.

Input type		11327
Circuit	*Setting range*	*Factory setting*
1	**OFF / AI / DI**	**OFF**
Choice of pressure input signal.		

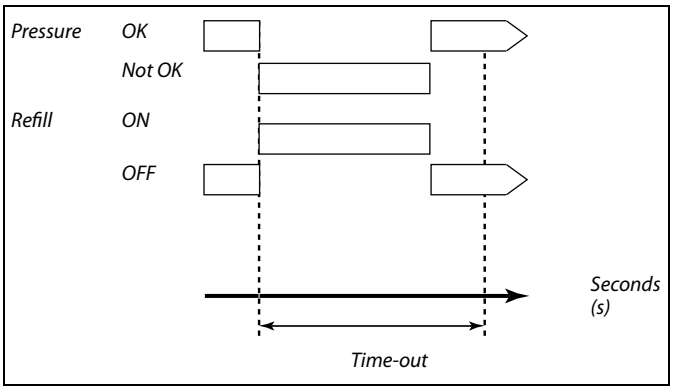
OFF: Pressure signal is not required. The refill water function is disabled.

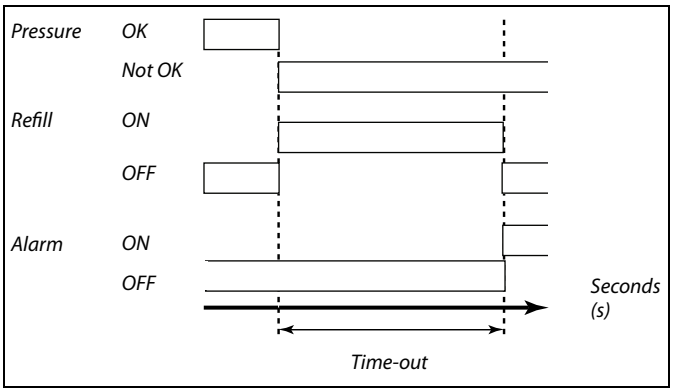
AI: The input signal is an analog signal (0 - 10 V).

DI: The input signal is a digital signal (switch OFF or ON).

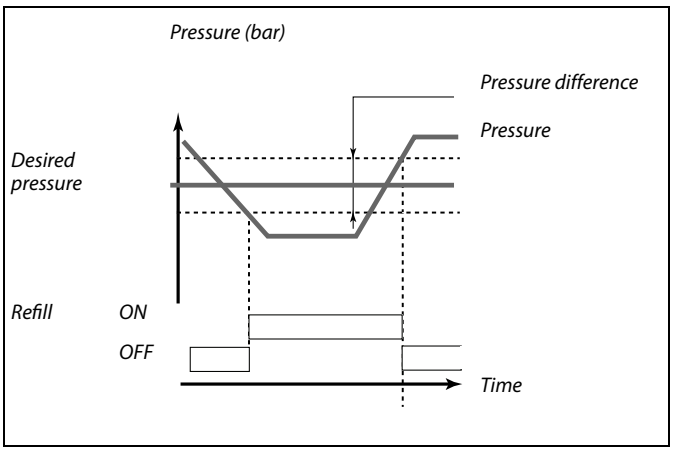
When selecting 'OFF', the refill water system could be self-acting.

Time-out		11323
Circuit	*Setting range*	*Factory setting*
1	**0 ... 1000 s**	**20 s**
Setting of the max. time for refill. The pressure, measured by S10, must be OK within the set time. If not, the refill water function stops and an alarm is activated.		





Pressure, des. (desired pressure)		11321
Circuit	*Setting range*	*Factory setting*
1	**0.0 ... 25.0 bar**	**3.0 bar**
Setting of the desired static pressure on the radiator (consumer) side. See also 'Pressure diff.'		



Pressure, diff. (switching difference)		11322
Circuit	*Setting range*	*Factory setting*
1	**0.1 ... 5.0 bar**	**1.5 bar**
Setting of the switching difference for measured static pressure (pressure transmitter). The difference is symmetrical around the 'Pressure des.' See also 'Pressure des.'		

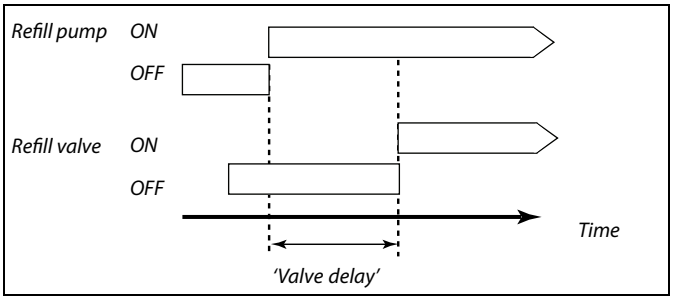
The settings in 'Pressure, des.' and 'Pressure, diff.' have no influence when a pressure switch is used.

P exercise (pump exercise)		11320
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 200 s**	**OFF**
The time the pump is activated during exercise. Exercise takes place every day (at 12:00).		

OFF: No pump exercise.

1 ... 200: Activation time during exercise.

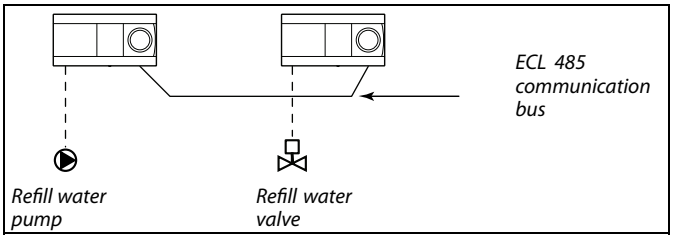
Valve delay		11325
Circuit	*Setting range*	*Factory setting*
1	**0 ... 30 s**	**1 s**
Setting of the time for activation of the ON/OFF valve after start of the refill water pump.		



No. of pumps		11326
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 2**	**1**
Setting of the number of pumps in the refill water circuit.		

OFF: The refill water pump function is controlled by the master controller.

1 ... 2: The refill water function has one or two pumps.



When selecting OFF and a demand for refill occurs, the controller for the actual circuit sends the requirement via the ECL 485 communication bus to the master controller.

The master must be running an application with refill water function. The master starts the refill water pump and sends, via the ECL 485 communication bus, a message that the refill water pump is started. The refill water valve then opens.

The slave must have an address 1 ... 9.

The static pressure is shown in 'Input overview' as a value in bar or OFF / ON.

Example:

OFF: The pressure switch is open (pressure is not OK)

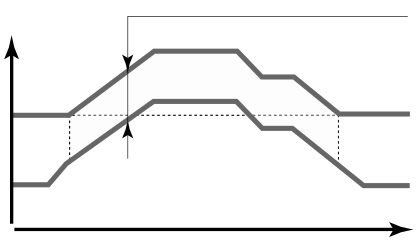
ON: The pressure switch is closed (pressure is OK)

5.8 Application

Demand offset		11017
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 20 K**	**OFF**
The desired flow temperature in heating circuit 1 can be influenced by the demand for a desired flow temperature from another controller (slave) or another circuit.		

OFF: The desired flow temperature in circuit 1 is not influenced by the demand of any other controller (slave or circuit 2).

1 ... 20: The desired flow temperature is increased by the set value in 'Demand offset', if the demand of the slave / circuit 2 is higher.



The function of 'Demand offset' can compensate for heat losses between master and slave controlled systems.

M exercise (valve exercise)		11023
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	**OFF**
Exercises the valve to avoid blocking in periods without heat demand.		

OFF: The valve exercise is not active.

ON: The valve opens for 7 minutes and closes for 7 minutes every third day at noon (12:00 hours).

DHW priority (closed valve / normal operation)		11052
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	**OFF**
The heating circuit can be closed when the controller acts as slave and when DHW charging is active in the master.		

This setting must be considered if this controller is a slave.

OFF: The flow temperature control remains unchanged during active DHW charging in the master controller.

ON: The valve in the heating circuit is closed* during active DHW charging in the master controller.
** The desired flow temperature is set to the value set in 'Frost pr. T'*

P frost T		11077
Circuit	*Setting range*	*Factory setting*
1	**OFF / -10 ... 20 °C**	**2 °C**
When the outdoor temperature is below the set temperature in 'P frost T', the controller automatically switches ON the circulation pump to protect the system.		

Under normal conditions, your system is not frost protected if your setting is below 0 °C or OFF.
For water-based systems, a setting of 2 °C is recommended.

OFF: No frost protection.

-10 ... 20: The circulation pump is ON when the outdoor temperature is below the set value.

P heat T (heat demand)		11078
Circuit	*Setting range*	*Factory setting*
1	**5 ... 40 °C**	**20 °C**
When the desired flow temperature is above the set temperature in 'P heat T', the controller automatically switches ON the circulation pump.		

5 ... 40: The circulation pump is switched ON when the desired flow temperature is above the set value.

Frost pr. T (frost protection temperature)		11093
Circuit	*Setting range*	*Factory setting*
1	**5 ... 40 °C**	**10 °C**
Set the desired flow temperature for example at heating cut-out, total stop etc. to protect the system against frost.		

5 ... 40: Desired frost protection temperature.

The valve is fully closed as long as the pump is not switched on.

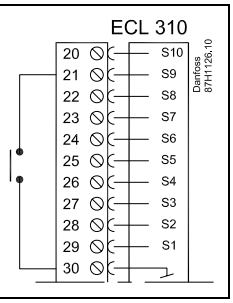
Ext. input (external override) — A361.1 / A361.2		11141
Circuit	*Setting range*	*Factory setting*
1	**OFF / S1 ... S10**	**OFF**
Choose the input for 'Ext. input' (external override). By means of a switch the controller can be overridden to 'Comfort' or 'Saving' mode.		

OFF: No inputs have been selected for external override.

S1 ... S10: Input selected for external override.

If S1... S6 is chosen as override input, the override switch must have gold-plated contacts.
If S7 ... S10 is chosen as override input, the override switch can be a standard contact.

See the drawing for a connection example of an override switch to input S9.

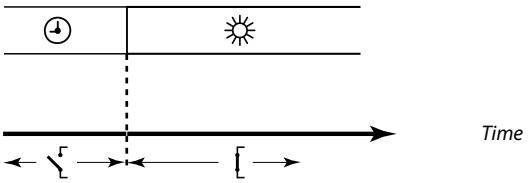


Choose only an unused input for override. If an already used input is applied for override, the functionality of this input is also neglected.

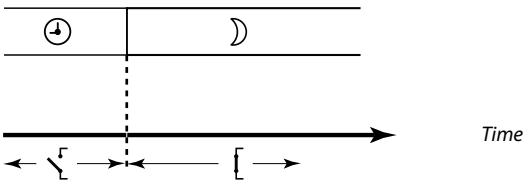
See also 'Ext. mode'.

The two drawings (override to comfort mode and override to saving mode) show the functionality.

Override to 'Comfort' mode



Override to 'Saving' mode



The result of override to 'Saving' mode depends on the setting in 'Total stop'.
Total stop = OFF: Heating reduced
Total stop = ON: Heating stopped

Ext. mode (external override mode)		11142
Circuit	*Setting range*	*Factory setting*
1	**COMFORT / SAVING**	**SAVING**
Choose external override mode.		

The mode override can be activated for saving or comfort mode. For override, the controller mode must be scheduled mode.

SAVING: The controller is in saving mode when the override switch is closed.

COMFORT: The controller is in comfort mode when the override switch is closed.

See also 'Ext. input'.

Min. act. time (min. activation time gear motor)		11189
Circuit	*Setting range*	*Factory setting*
1	**2 ... 50**	**10**
The min. pulse period of 20 ms (milliseconds) for activation of the gear motor.		

Setting example	Value x 20 ms
2	40 ms
10	200 ms
50	1000 ms

The setting should be kept as high as acceptable to increase the lifetime of the actuator (gear motor).

5.9 Alarm

Many applications in the ECL Comfort 210 and 310 series have an alarm function. The alarm function typically activates relay 4 (ECL Comfort 210) or relay 6 (ECL Comfort 310).

The alarm relay can activate a lamp, a horn, an input to an alarm transmitting device etc. etc.

The relay in question is activated as long as the alarm condition is present.

Typical alarms:

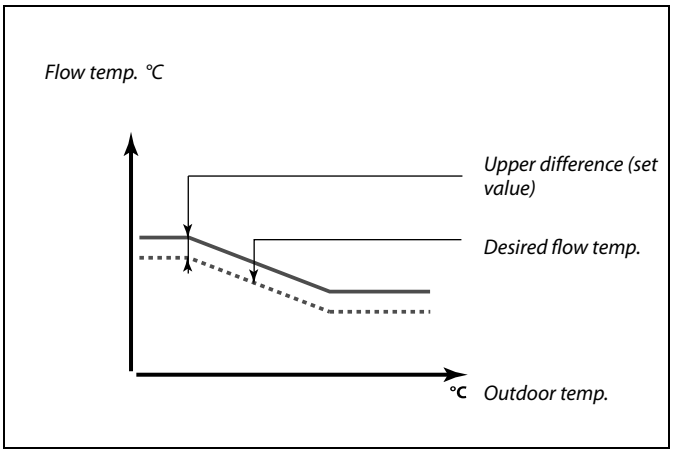
- Actual flow temperature differs from the desired flow temperature.
- An activated circulation pump does not generate a pressure difference.
- The refill water function does not generate a pressure within a preset time.
- A universal alarm input (application dependent) is activated.

5.9.1 Temp. monitor.

Upper difference		**11147**
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 30 K**	**OFF**
The alarm is activated if the actual flow temperature increases more than the set difference (acceptable temperature difference above the desired flow temperature). See also 'Delay'.		

OFF: The alarm function is not active.

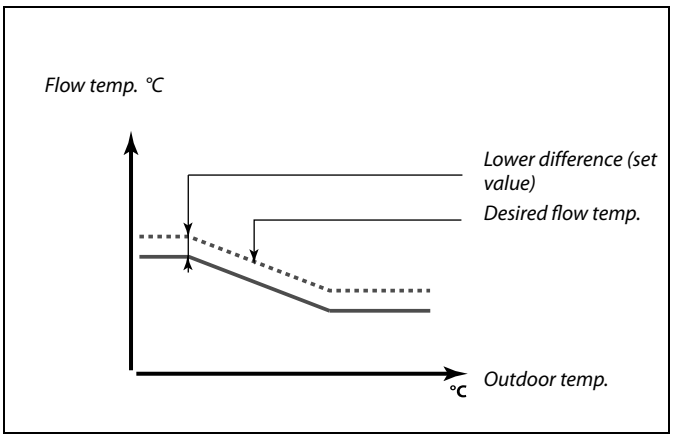
1 ... 30 K: The alarm function is active if the actual temperature gets above the acceptable difference.



Lower difference		**11148**
Circuit	*Setting range*	*Factory setting*
1	**OFF / 1 ... 30 K**	**OFF**
The alarm is activated if the actual flow temperature decreases more than the set difference (acceptable temperature difference below the desired flow temperature). See also 'Delay'.		

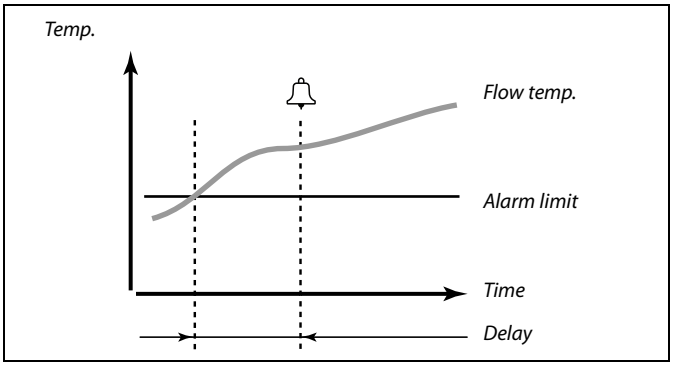
OFF: The alarm function is not active.

1 ... 30 K: The alarm function is active if the actual temperature gets below the acceptable difference.



Delay		11149
Circuit	*Setting range*	*Factory setting*
1	**1 ... 99 m**	**10 m**
If an alarm condition from either 'Upper difference' or 'Lower difference' is present for a longer time than the set delay (in min.), the alarm function is activated.		

1 ... 99 m: The alarm function will be activated if the alarm condition remains after the set delay.



Lowest temp.		11150
Circuit	*Setting range*	*Factory setting*
1	**10 ... 50 °C**	**30 °C**
The alarm function will not be activated if the desired flow temperature is lower than the set value.		

If the cause of the alarm disappears, the alarm indication and output also disappear.

5.9.2 Clear alarm

If an alarm has been generated, a bell is shown in one of the favorite display (see 'Monitoring temperatures and system components') or in an overview display (see 'Understanding the controller display'). The following menus are used to locate the alarm cause and reset (clear) the alarm signal. Even when the cause of the alarm has disappeared, the indication will still be active until the clear alarm procedure has been carried out.

Circ. pumps		11315
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	
Choose whether the alarm should be cleared or not.		

OFF: The alarm has not been activated.

ON: The alarm has been activated.

Clear alarm procedure:

If the status is 'ON': Change 'ON' to 'OFF'.

If the status is 'OFF': It is not possible to change it to 'ON'.

Refill water		**11324**
Circuit	*Setting range*	*Factory setting*
1	**OFF / ON**	
Choose whether the alarm should be cleared or not.		

OFF: The alarm has not been activated.

ON: The alarm has been activated.

Clear alarm procedure:

If the status is 'ON': Change 'ON' to 'OFF'.

If the status is 'OFF': It is not possible to change it to 'ON'.

5.9.3 Alarm overview

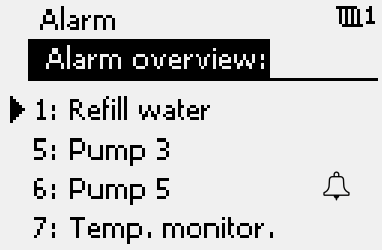
The alarm overview lists the components or functions that could cause an alarm.

The number to the left (i.e. 1, 5, 6, 7) relates to the alarm number which is sent by Modbus communication to a SCADA system.

Two alarm types can be present, ie. the alarms that are logged and the alarms that are not logged.

Example:
The alarm type for 'Refill water', 'Pump 3' and 'Pump 5' are logged alarms. This means that the alarm symbol will remain until the alarm has been cleared even if the cause of the alarm has disappeared.

The alarm type for 'Temp. monitor' e.g. is not a logged alarm which means that the alarm symbol will only be present as long as the alarm cause exists.



Example:

'Pump P5' has caused an alarm.

The alarm overview will only list components or functions that could cause an alarm.

6.0 Settings, circuit 2

6.1 Flow temperature

6.1.1 A361.1

The ECL Comfort controller determines and controls the flow temperature related to the outdoor temperature. This relationship is called the heat curve.

The heat curve is set by means of 6 coordinate points. The desired flow temperature is set at 6 pre-defined outdoor temperature values.

The shown value for the heat curve is an average value (slope), based on the actual settings.

Outdoor temp.	Desired flow temp.			Your settings
	A	B	C	
-30 °C	45 °C	**75 °C**	95 °C	
-15 °C	40 °C	**60 °C**	90 °C	
-5 °C	35 °C	**50 °C**	80 °C	
0 °C	32 °C	**45 °C**	70 °C	
5 °C	30 °C	**40 °C**	60 °C	
15 °C	25 °C	**28 °C**	35 °C	

Adjust the desired flow temperature at -30, -15, -5, 0, 5, and 15 °C, if required.

A: Example for floor heating
B: Factory settings
C: Example for radiator heating (high demand)

Heat curve		
Circuit	*Setting range*	*Factory setting*
2	**Read-out only**	

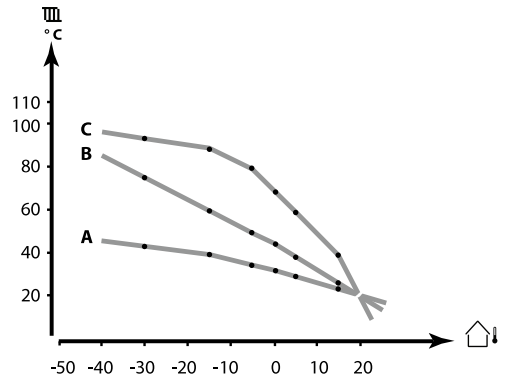
Push the dial to enter / change the coordinates of the heat curve.

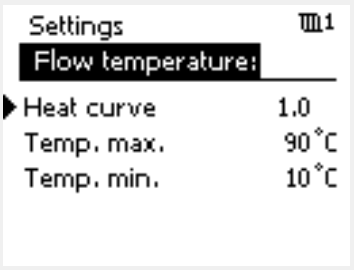
The heat curve represents the desired flow temperatures at different outdoor temperature and at a desired room temperature of 20 °C.

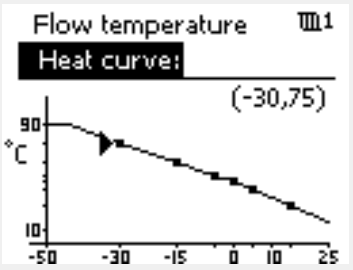
If the desired room temperature is changed, the desired flow temperature also changes:

(Desired room T - 20) × HC × 2.5
where "HC" is the Heat Curve slope and "2.5" is a constant.

Desired flow temperature







The calculated flow temperature can be influenced by the 'Boost' and 'Ramp' functions etc.

Example:

Heat curve:	1.0
Desired flow temp.:	50 °C
Desired room temp.:	22 °C
Calculation (22–20) × 1.0 × 2.5 =	5

Result:
The desired flow temperature will be corrected from 50 °C to 55 °C.

Max. limitation of the desired flow temperature:

In the application A361.1 the max. limitation value is selectable in 'Temp. max.'.

Temp. max. (flow temp. limit, max.) — A361.1		**12178**
Circuit	*Setting range*	*Factory setting*
2	**10 ... 150 °C**	**90 °C**

Set the max. flow temperature for the system. The desired flow temperature will not be higher than this setting. Adjust the factory setting, if required.

The setting for 'Temp. max.' has higher priority than 'Temp. min.'.

Temp. min. (flow temp. limit, min.)		**12177**
Circuit	*Setting range*	*Factory setting*
2	**10 ... 150 °C**	**10 °C**

Set the min. flow temperature for the system. The desired flow temperature will not be lower than this setting. Adjust the factory setting, if required.

'Temp. min.' is overruled if 'Total stop' is active in Saving mode or 'Cut-out' is active.
'Temp. min.' can be overruled by the influence from the return temperature limitation (see 'Priority').

The setting for 'Temp. max.' has higher priority than 'Temp. min.'.

6.1.2 A361.2

The ECL Comfort controller determines and controls the flow temperature related to the supply temperature (S2). This relationship is set in the controller.

The heat curve is set in all coordinate points to the max. desired flow temperature (150 °C). The desired flow temperature will always be in relation to the supply temperature (S2).

The shown value for the heat curve is an average value (slope), based on the actual settings.

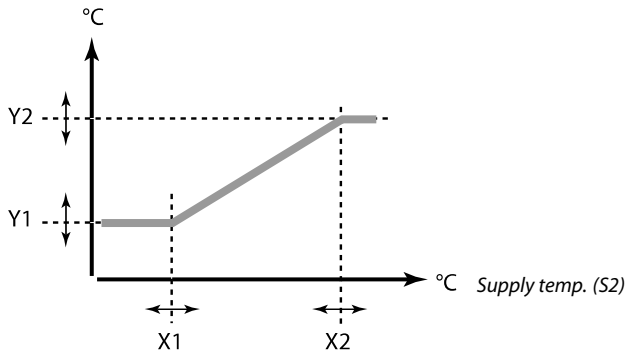
Outdoor temp.	Factory setting	Your settings
-30 °C	**150 °C**	
-15 °C	**150 °C**	
-5 °C	**150 °C**	
0 °C	**150 °C**	
5 °C	**150 °C**	
15 °C	**150 °C**	

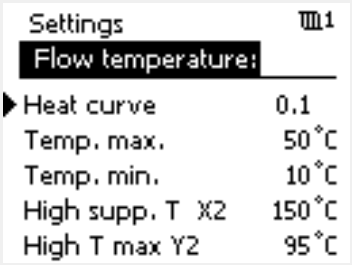
Adjust the desired flow temperature at -30, -15, -5, 0, 5, and 15 °C, if required.

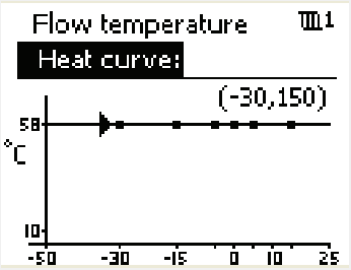
Heat curve		
Circuit	*Setting range*	*Factory setting*
2	**Read-out only**	

The factory setting (a general desired flow temperature of 150 °C) is limited to a max. value based on the supply temperature (S2) and the settings in parameters 'High supp. T X2', 'High T max Y2', 'Low supply T X1' and 'Low T max Y1'.

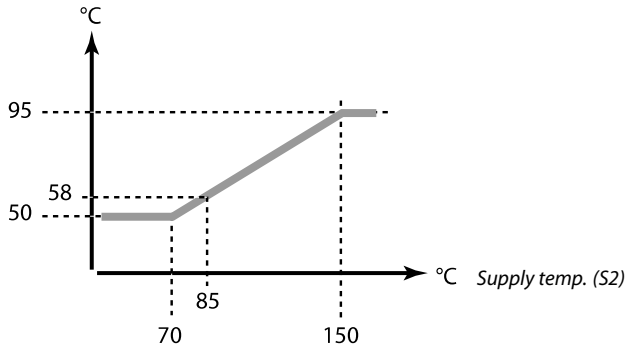
Desired flow temperature







Desired flow temperature



The above heat curve is an example of a supply temperature (S2) of 85 °C. The desired flow temperature (58 °C) is based on the set-up of the relationship between the supply temperature (S2) and the desired flow temperature.

Max. limitation of the desired flow temperature:

In the application A361.2 the desired flow temperature or max. limitation value depends on the supply temperature (S2). The relationship is set in the four settings 'High supp. T X2', 'High T max Y2', 'Low supply T X1' and 'Low T max Y1'.

When setting the heat curve coordinates as described in the section 'A361.1', the desired flow temperature can be limited to a maximum according to the supply temperature (S2).

Temp. max. (flow temp. limit, max.) — A361.2		
Circuit	*Setting range*	*Factory setting*
2	**Read-out only**	

The supply temperature (S2) determines the desired flow temperature. The value is calculated on basis of the settings in the following parameters: 'High supp. T X2', 'High T max Y2', 'Low supply T X1' and 'Low T max Y1'.

Temp. min. (flow temp. limit, min.)		**12177**
Circuit	*Setting range*	*Factory setting*
2	**10 ... 150 °C**	**10 °C**

Set the min. flow temperature for the system. The desired flow temperature will not be lower than this setting. Adjust the factory setting, if required.

'Temp. min.' is overruled if 'Total stop' is active in Saving mode or 'Cut-out' is active.
'Temp. min.' can be overruled by the influence from the return temperature limitation (see 'Priority').

The setting for 'Temp. max.' has higher priority than 'Temp. min.'.

High supp. T X2 (high value of supply temp.) — A361.2		**12300**
Circuit	*Setting range*	*Factory setting*
2	**10 ... 150 °C**	**150 °C**

Set the high value for the supply temperature in relation to the desired max. flow temperature. When the supply temperature is above the set value, the max. limitation of the flow temperature is the Y2 value. When the supply temperature is below the set value, the max. limitation of the flow temperature will be lower.

High T max Y2 (high value of max limitation) — A361.2		**12301**
Circuit	*Setting range*	*Factory setting*
2	**10 ... 150 °C**	**95 °C**

Set the high value for the max. limitation of the desired flow temperature.

Low supply T X1 (low value of supply temp.) — A361.2		12302
Circuit	*Setting range*	*Factory setting*
2	**10 ... 150 °C**	**70 °C**

Set the low value for the supply temperature in relation to the desired max. flow temperature. When the supply temperature is below the set value, the max. limitation of the flow temperature is the Y1 value. When the supply temperature is above the set value, the max. limitation of the flow temperature will be higher.

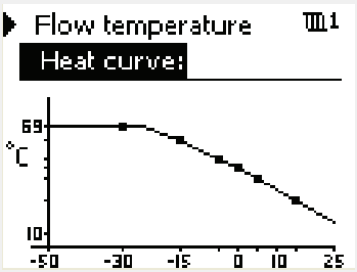
Low T max Y1 (low value of max limitation) — A361.2		12303
Circuit	*Setting range*	*Factory setting*
2	**10 ... 150 °C**	**50 °C**

Set the low value for the max. limitation of the desired flow temperature.

Set-up procedure when the supply temperature (S2) has to limit the desired flow temperature to a maximum:

1. Choose 'Heat curve'.
2. Set the desired flow temperature in all 6 coordinates (-30 °C, -15 °C etc.) to the desired values.

Result:
The desired flow temperature will be in relation to the outdoor temperature but will be limited to a maximum according the settings in 'High supp. T X2', 'High T max Y2', 'Low supply T X1' and 'Low T max Y1'.



The example shows the max. limitation of the desired flow temperature when the supply temperature (S2) is 105 °C.

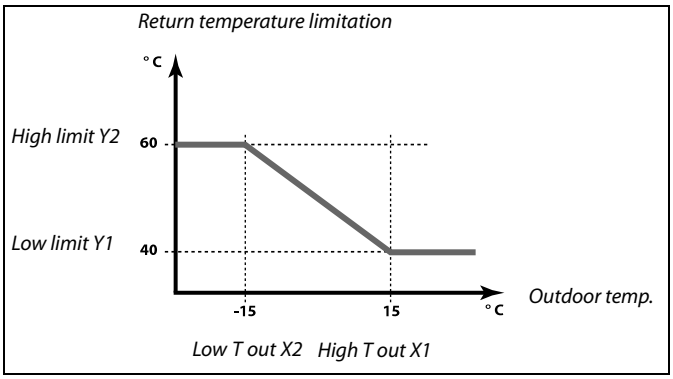
6.2 Return limit

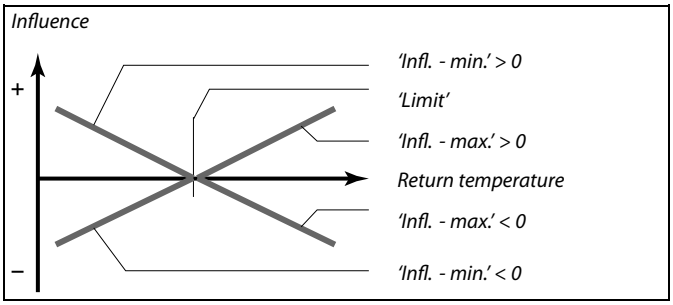
The return temperature limitation is based on the outdoor temperature. Typically in district heating systems a higher return temperature is accepted at a decrease in outdoor temperature. The relationship between the return temperature limits and outdoor temperature is set in two coordinates.

The outdoor temperature coordinates are set in 'High T out X1' and 'Low T out X2'. The return temperature coordinates are set in 'High limit Y2' and 'Low limit Y1'.

The controller automatically changes the desired flow temperature to obtain an acceptable return temperature when the return temperature falls below or gets higher than the calculated limit.

This limitation is based on a PI regulation where P ('Infl.' factor) responds quickly to deviations and I ('Adapt. time') responds slower and over time removes the small offsets between the desired and actual values. This is done by changing the desired flow temperature.





If the 'Infl.' factor is too high and / or the 'Adapt. time' too low, there is a risk of unstable control.

High T out X1 (return temp. limitation, high limit, X-axis)		**12031**
Circuit	*Setting range*	*Factory setting*
2	**-60 ... 20 °C**	**15 °C**
Set the outdoor temperature for the low return temperature limitation.		

The corresponding Y coordinate is set in 'Low limit Y1'.

Low limit Y1 (return temp. limitation, low limit, Y-axis)		**12032**
Circuit	*Setting range*	*Factory setting*
2	**10 ... 150 °C**	**40 °C**
Set the return temperature limitation referring to the outdoor temperature set in 'High T out X1'.		

The corresponding X coordinate is set in 'High T out X1'.

Low T out X2 (return temp. limitation, low limit, X-axis)		**12033**
Circuit	*Setting range*	*Factory setting*
2	**-60 ... 20 °C**	**-15 °C**
Set the outdoor temperature for the high return temperature limitation.		

The corresponding Y coordinate is set in 'High limit Y2'.

High limit Y2 (return temp. limitation, high limit, Y-axis)		12034
Circuit	*Setting range*	*Factory setting*
2	**10 ... 150 °C**	**60 °C**
Set the return temperature limitation referring to the outdoor temperature set in 'Low T out X2'.		

The corresponding X coordinate is set in 'Low T out X2'.

Infl. - max. (return temp. limitation - max. influence)		12035
Circuit	*Setting range*	*Factory setting*
2	**-9.9 ... 9.9**	**0.0**
Determines how much the desired flow temperature will be influenced if the return temperature is higher than the desired limit (see 'Limit').		

Influence higher than 0:
The desired flow temperature is increased, when the return temperature gets higher than the set limit.

Influence lower than 0:
The desired flow temperature is decreased, when the return temperature gets higher than the set limit.

Example
The return limit is active above 50 °C.
The influence is set to -2.0.
The actual return temperature is 2 degrees too high.
Result:
The desired flow temperature is changed by -2.0 x 2 = -4.0 degrees.

Normally, this setting is lower than 0 in district heating systems to avoid a too high return temperature.
Typically, this setting is 0 in boiler systems because a higher return temperature is acceptable (see also 'Infl. - min.').

Infl. - min. (return temp. limitation - min. influence)		12036
Circuit	*Setting range*	*Factory setting*
2	**-9.9 ... 9.9**	**0.0**
Determines how much the desired flow temperature will be influenced if the return temperature is lower than the desired limit (see 'Limit').		

Influence higher than 0:
The desired flow temperature is increased, when the return temperature gets below the set limit.

Influence lower than 0:
The desired flow temperature is decreased, when the return temperature gets below the set limit.

Example
The return limit is active below 50 °C.
The influence is set to -3.0.
The actual return temperature is 2 degrees too low.
Result:
The desired flow temperature is changed by -3.0 x 2 = -6.0 degrees.

Normally, this setting is 0 in district heating systems because a lower return temperature is acceptable.
Typically, this setting is higher than 0 in boiler systems to avoid a too low return temperature (see also 'Infl. - max.').

Adapt. time (adaptation time)		12037
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 50 s**	**25 s**
Controls how fast the return temperature adapts to the desired return temperature limit (I control).		

The adaptation function can correct the desired flow temperature with max. 8 K.

OFF: The control function is not influenced by the 'Adapt. time'.

1: The desired temperature is adapted quickly.

50: The desired temperature is adapted slowly.

Priority (priority for return temp. limitation)		**12085**
Circuit	*Setting range*	*Factory setting*
2	**OFF / ON**	**OFF**
Choose whether the return temperature limitation should overrule the set min. flow temperature 'Temp. min.'.		

OFF: The min. flow temperature limit is not overruled.

ON: The min. flow temperature limit is overruled.

6.3 Flow / power limit

A flow or energy meter can be connected to the ECL controller in order to limit the flow or consumed power. The signal from the flow or energy meter is based on M-bus signal.

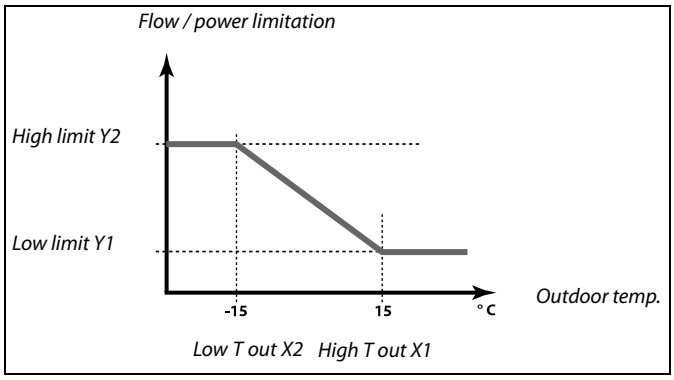
The flow / power limitation can be based on the outdoor temperature. Typically, in district heating systems a higher flow or power is accepted at lower outdoor temperatures.

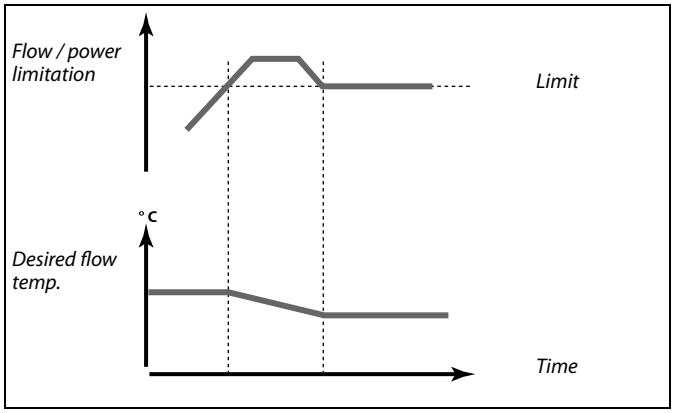
The relationship between the flow or power limits and the outdoor temperature is set in two coordinates.

The outdoor temperature coordinates are set in 'High T out X1' and 'Low T out X2'.

The flow or power coordinates are set in 'Low limit Y1' and 'High limit Y2'. Based on these settings, the controller calculates the limitation value.

When the flow / power gets higher than the calculated limit, the controller gradually reduces the desired flow temperature to obtain an acceptable max. flow or power consumption.





If the 'Adapt. time' is too high, there is a risk of unstable control.

Actual (actual flow or power)		**12110**
Circuit	*Setting range*	*Factory setting*
2	**Read-out only**	
The value is the actual flow or power based on the signal from flow / energy meter, converted in the controller.		

Limit (limitation value)		**12111**
Circuit	*Setting range*	*Factory setting*
2	**0.0 ... 999.9 l/h**	**999.9 l/h**
Set the limitation value.		

High T out X1 (flow / power limitation, high limit, X-axis)		**12119**
Circuit	*Setting range*	*Factory setting*
2	**-60 ... 20 °C**	**15 °C**
Set the outdoor temperature for the low flow / power limitation.		

The corresponding Y coordinate is set in 'Low limit Y1'.

Low limit Y1 (flow / power limitation, low limit, Y-axis)		12117
Circuit	*Setting range*	*Factory setting*
2	**0.0 ... 999.9 l/h**	**999.9 l/h**
Set the flow / power limitation referring to the outdoor temperature set in 'High T out X1'.		

The corresponding X coordinate is set in 'High T out X1'.

Low T out X2 (flow / power limitation, low limit, X-axis)		12118
Circuit	*Setting range*	*Factory setting*
2	**-60 ... 20 °C**	**-15 °C**
Set the outdoor temperature for the high flow / power limitation.		

The corresponding Y coordinate is set in 'High limit Y2'.

High limit Y2 (flow / power limitation, high limit, Y-axis)		12116
Circuit	*Setting range*	*Factory setting*
2	**0.0 ... 999.9 l/h**	**999.9 l/h**
Set the flow / power limitation referring to the outdoor temperature set in 'Low T out X2'.		

The corresponding X coordinate is set in 'Low T out X2'.

Adapt. time (adaptation time)		12112
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 50 s**	**OFF**
Controls how fast the flow / power limitation adapts to the desired limitation.		

OFF: The control function is not influenced by the 'Adapt. time'.

1: The desired temperature is adapted slowly.

50: The desired temperature is adapted quickly.

Filter constant		12113
Circuit	*Setting range*	*Factory setting*
2	**1 ... 50**	**10**
The actual filter dampens the flow / power input data by the set factor.		

1: No filtering.

2: Fast (low filter constant)

50: Slow (high filter constant)

The limitation function can overrule the set 'Temp. min' of the desired flow temperature.

Input type		12109
Circuit	*Setting range*	*Factory setting*
2	**OFF / EM1 ... EM5**	**OFF**
Choice of M-bus signal from energy meter number 1 ... 5.		

OFF: No M-bus signal acquired.

EM1 ... EM5: Energy meter number.

Units		12115
Circuit	*Setting range*	*Factory setting*
2	**See the list**	**l/h**
Choice of units for measured values.		

Flow values are expressed as l/h or m^3/h
Power values are expressed as kW, MW or GW.

List for setting range of 'Units':
l/h
m^3/h
kW
MW
GW

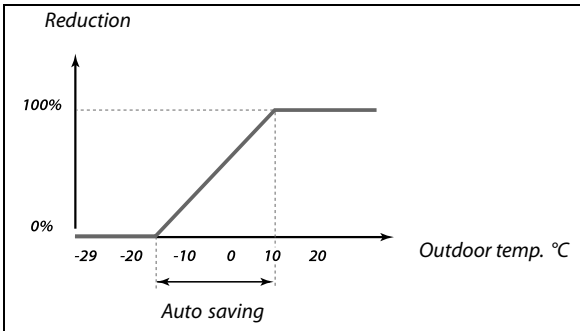
6.4 Optimization

Auto saving (saving temp. dependent on outdoor temp.)		12011
Circuit	*Setting range*	*Factory setting*
2	**OFF / -29 ... 10 °C**	**-15 °C**
Below the set value for the outdoor temperature, the saving temperature setting has no influence. Above the set value for the outdoor temperature, the saving temperature relates to the actual outdoor temperature. The function is relevant in district heating installations in order to avoid a big change in the desired flow temperature after a saving period.		

OFF: The saving temperature does not depend on the outdoor temperature.

-29 ... 10: The saving temperature depends on the outdoor temperature. When the outdoor temperature is above 10 °C, the reduction is 100%. The lower the outdoor temperature, the less the temperature reduction. When the outdoor temperature is below the set limit, there is no temperature reduction.

The comfort and the saving temperatures are set in the display overviews. The difference between the comfort and the saving temperature is considered to be 100%. Depending on the outdoor temperature, the percentage value can be lower according to the set value in 'Auto saving'.



Example:

Outdoor temp.:	–5 °C
Desired room temp. in Comfort mode:	22 °C
Desired room temp. in Saving mode:	16 °C
Setting in 'Auto saving':	–15 °C

The drawing above illustrates that the reduction percentage at an outdoor temperature of –5 °C is 40%.

The difference between Comfort and Saving temperature is (22–16) = 6 degrees.

40% of 6 degrees = 2.4 degrees

The 'Auto saving' temperature is corrected to (22–2.4) = 19.6 °C.

Boost		12012
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 99%**	**OFF**
Shortens the heating-up period by increasing the desired flow temperature by the percentage you set.		

OFF: The boost function is not active.

1-99%: The desired flow temperature is increased temporarily with the set percentage.

In order to shorten the heating-up period after a saving temperature period, the desired flow temperature can be increased temporarily (max. 1 hour). At optimizing the boost is active in the optimization period ('Optimizer').

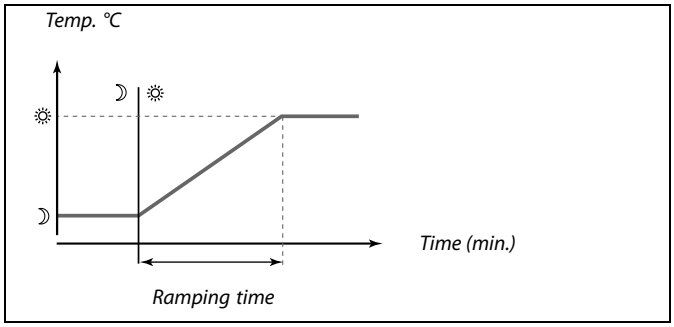
If a room temperature sensor or an ECA 30 / 31 is connected, the boost stops when the room temperature is reached.

Ramp (reference ramping)		12013
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 99 m**	**OFF**
The time (minutes) in which the desired flow temperature increases gradually to avoid load peaks in the heat supply.		

OFF: The ramping function is not active.

1-99 m: The desired flow temperature is increased gradually with the set minutes.

In order to avoid load peaks in the supply network, the flow temperature can be set to increase gradually after a period with saving temperature. This causes the valve to open gradually.



Optimizer (optimizing time constant)		12014
Circuit	*Setting range*	*Factory setting*
2	**OFF / 10 ... 59**	**OFF**
Optimizes the start and stop times for the comfort temperature period to obtain the best comfort at the lowest energy consumption. *The lower the outdoor temperature, the earlier the heating cut-in. The lower the outdoor temperature, the later the heating cut-out.* *The optimized heating cut-out time can be automatic or disabled. The calculated start and stop times are based on the setting of the optimizing time constant.*		

Adjust the optimizing time constant.

The value consists of a two digit number. The two digits have the following meaning (digit 1 = Table I, digit 2 = Table II).

OFF: No optimization. The heating starts and stops at the times set in the schedule.

10 ... 59: See tables I and II.

Table I:

Left digit	Heat accumulation of the building	System type
1-	light	Radiator systems
2-	medium	
3-	heavy	
4-	medium	Floor heating systems
5-	heavy	

Table II:

Right digit	Dimensioning temperature	Capacity
-0	-50 °C	large
-1	-45 °C	·
·	·	·
-5	-25 °C	normal
·	·	·
-9	-5 °C	small

Dimensioning temperature:
The lowest outdoor temperature (usually determined by your system designer in connection with the design of the heating system) at which the heating system can maintain the designed room temperature.

Example
The system type is radiator, and the heat accumulation of the building is medium.
The left digit is 2.
The dimensioning temperature is -25 °C, and the capacity is normal.
The right digit is 5.

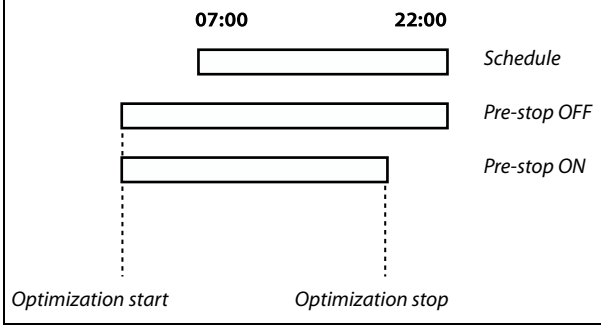
Result:
The setting is to be changed to 25.

Pre-stop (optimized stop time)		**12026**
Circuit	*Setting range*	*Factory setting*
2	**OFF / ON**	**ON**
Disable the optimized stop time.		

OFF: The optimized stop time is disabled.

ON: The optimized stop time is enabled.

Example: Optimization of Comfort from 07:00 - 22:00

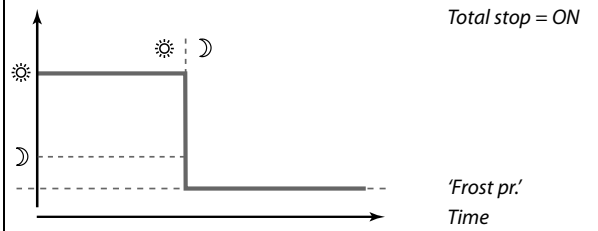


Total stop		**12021**
Circuit	*Setting range*	*Factory setting*
2	**OFF / ON**	**OFF**
Decide whether you want a total stop during the saving temperature period.		

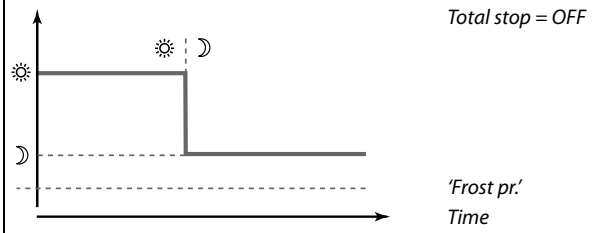
OFF: No total stop. The desired flow temperature is reduced according to:
- desired room temperature in saving mode
- auto saving

ON: The desired flow temperature is lowered to the set value in 'Frost pr.' The circulation pump is stopped but frost protection is still active, see 'P frost T'.

Desired flow temp. °C



Desired flow temp. °C



The min. flow temperature limitation ('Temp. min.') is overruled when 'Total stop' is ON.

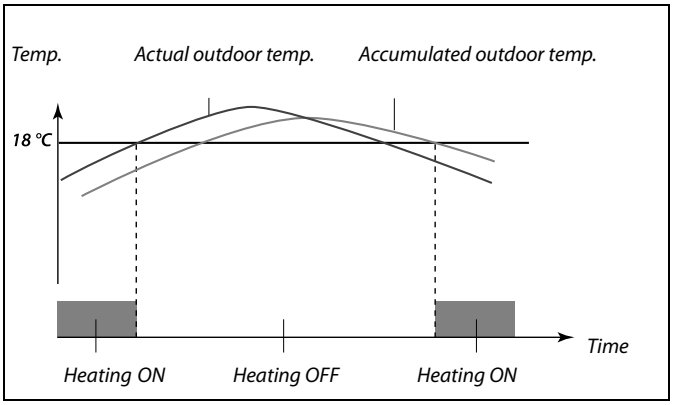
Cut-out (limit for heating cut-out)		12179
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 50 °C**	**20 °C**

The heating can be switched OFF when the outdoor temperature is higher than the set value. The valve closes and after the post-run time, the heating circulation pump stops. 'Temp. min.' will be overruled.

The heating system switches ON again when the outdoor temperature and the accumulated (filtered) outdoor temperature become lower than the set limit.

This function can save energy.

Set the value for outdoor temperature at which you want the heating system to switch OFF.



The heating cut-out is only active when the controller mode is in scheduled operation. When the cut-out value is set to OFF, there is no heating cut-out.

6.5 Control parameters

Motor pr. (motor protection)		12174
Circuit	*Setting range*	*Factory setting*
2	**OFF / 10 ... 59 m**	**OFF**
Prevents the controller from unstable temperature control (and resulting actuator oscillations). This can occur at very low load. The motor protection increases the lifetime of all involved components.		

OFF: Motor protection is not activated.

10 ... 59: Motor protection is activated after the set activation delay (minutes).

Recommended for DHW systems with variable load.

Xp (proportional band)		12184
Circuit	*Setting range*	*Factory setting*
2	**5 ... 250 K**	**40 K**

Set the proportional band. A higher value will result in a stable but slow control of the flow temperature.

Tn (integration time constant)		12185
Circuit	*Setting range*	*Factory setting*
2	**1 ... 999 s**	**20 s**

Set a high integration time constant to obtain a slow but stable reaction to deviations.

A low integration time constant (in seconds) will make the controller react fast but with less stability.

M run (running time of the motorized control valve)		12186
Circuit	*Setting range*	*Factory setting*
2	**5 ... 250 s**	**20 s**

'M run' is the time in seconds it takes the controlled component to move from fully closed to fully open position. Set the 'M run' according to the examples or measure the running time by means of a stop watch.

How to calculate the running time of a motorized control valve
The running time of the motorized control valve is calculated using the following methods:

Seated valves

Running time = Valve stroke (mm) x actuator speed (sec. / mm)

Example: 5.0 mm x 15 sec. / mm = 75 sec.

Rotating valves

Running time = Turning degrees x actuator speed (sec. / degr.)

Example: 90 degr. x 2 sec. / degr. = 180 sec.

Nz (neutral zone)		12187
Circuit	*Setting range*	*Factory setting*
2	**1 ... 9 K**	**3 K**

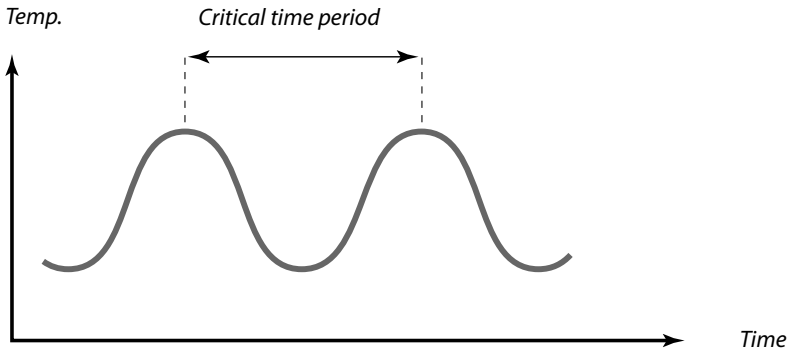
Set the acceptable flow temperature deviation.

Set the neutral zone to a high value if you can accept a high variation in flow temperature. When the actual flow temperature is within the neutral zone, the controller does not activate the motorized control valve.

The neutral zone is symmetrical around the desired flow temperature value, i.e. half the value is above and half the value is below this temperature.

If you want to tune the PI regulation precisely, you can use the following method:

- Set the 'Tn' (integration time constant) to its max. value (999 sec.).
- Decrease the value for the 'Xp' (proportional band) until the system starts hunting (i.e. gets unstable) with a constant amplitude (it might be necessary to force the system by setting an extreme low value).
- Find the critical time period on the temperature recorder or use a stop watch.



This critical time period will be characteristic for the system, and you can evaluate the settings from this critical period.

'Tn' = 0.85 x critical time period

'Xp' = 2.2 x proportional band value in the critical time period

If the regulation seems to be too slow, you can decrease the proportional band value by 10%. Make sure there is a consumption when you set the parameters.

6.6 Pump control

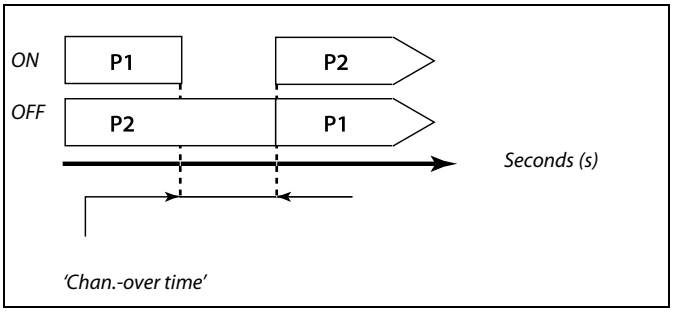
This application can operate with one or two circulation pumps. When operating with two circulation pumps, the pumps are controlled alternately, according to a time set-up. When a pump is switched ON the controller is waiting for differential pressure (S7 for heating circuit, S8 for DHW circuit) to build up. If differential pressure is not achieved, an alarm is generated and the ECL Comfort controller switches ON the other pump.

If none of the pumps can come into operation (detected by means of the differential pressure switch), the alarm is activated and the motorized control valve closes (a safety function).

Chan.-over time (change-over time)		**12314**
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 99 s**	**5 s**
Setting of time to elapse between the pump stop command for one pump and the start command for the other pump. The change-over time can ensure that a pump is stopped efficiently before the other pump starts.		

OFF: One circulation pump in the application.

1 ... 99: Time for change-over.



'Chan.-over time'

'Chan.-over time' has to be chosen in systems with two pumps.

Retry time		**12310**
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1... 99 m**	**20 m**
If an alarm has been generated for the pump or alarms have been generated for both pumps, this setting will determine the time between the time of the alarm and the retry time for repeated pump start.		

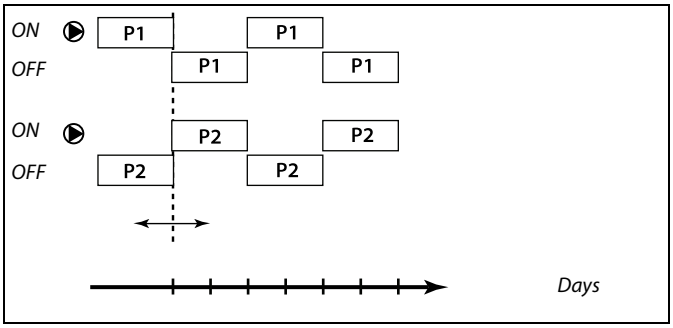
OFF: No retry time required after an alarm. The pump or pumps in question will not be restarted.

1 ... 99: After an alarm, the pump or pumps will be restarted after the set time.

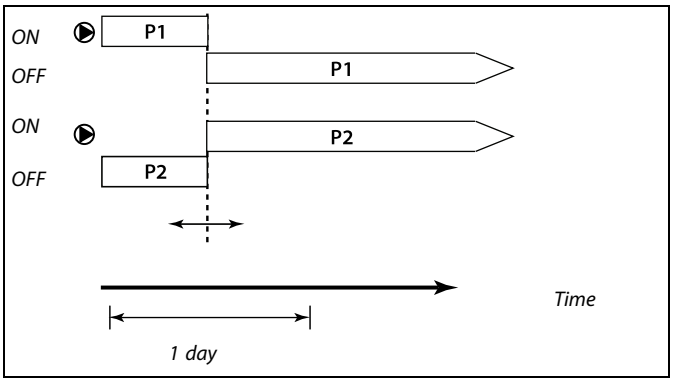
Stab. time (stabilization time)		**12313**
Circuit	*Setting range*	*Factory setting*
2	**1... 99 s**	**15 s**
Setting of max. time to elapse between pump start command and feedback from differential pressure switch. If the differential pressure switch does not give feedback within the set time, the alarm will be activated and the other pump will get a start command.		

If the chosen stabilization time ('Stab. time') is too short, the active pump will stop immediately after the stabilization time has elapsed.

Change, duration		12311
Circuit	*Setting range*	*Factory setting*
2	**1 ... 10**	**2**
The number of days between shift of circulation pumps. The shift takes place at the time set in 'Change time'.		



Change time (changeover time)		12312
Circuit	*Setting range*	*Factory setting*
2	**0 ... 23**	**12**
The exact time of the day, where the shift must take place. The day is divided into 24 hours. The factory setting here is 12 which means 12:00 (noon).		



P exercise (pump exercise)		12022
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 200 s**	**OFF**
The time the pump is activated during exercise. Exercise takes place every day (at 12:20) when no heat demand has been present.		

OFF: No pump exercise.

1 ... 200: Activation time during exercise.

The feedback from the differential pressure switch is active and will activate the alarm in case that the pump does not start.

The status of the differential pressure switch is shown in 'Input overview'.

Example:

S7 status . . . OFF / ON

OFF: The differential pressure switch is closed (differential pressure is OK)

ON: The differential pressure switch is open (differential pressure is not OK)

6.7 Refill water

Leaks on the consumers side will result in falling static pressure and thereby a poor supply of heating. A refill water function can inject water to increase the static pressure.

This application can monitor the static pressure and enable the refill water function when the pressure is too low.

The pressure is measured by means of a pressure transmitter (giving a 0 - 10 volt signal in relation to the measured pressure) or a pressure switch.

When a pressure transmitter signal is used, two settings in the controller represent pressure setpoint and difference.

When a pressure switch signal is used, the setpoint and (maybe) the switching difference is set on the pressure switch.

When a too low pressure is detected the refill water pump is switched ON and, after a set time, the ON-OFF valve is activated.

If the pressure is not achieved within a set time, an alarm is generated. The ECL Comfort controller switches OFF the circulation pumps after 60 seconds and the control valve closes (a safety function).

Pressure		
Circuit	*Setting range*	*Factory setting*
1	**Read-out only**	

The read-out can be a value (in bar):

- The pressure is measured by means of a pressure transmitter. The transmitter sends the measured pressure as a 0-10 V or a 4-20 mA signal. The voltage signal can be applied directly to input S10. A current signal is converted by means of a resistor to a voltage and then applied to input S10. The measured voltage on input S10 must be converted to a pressure value by the controller. This procedure sets up the scaling.

  Push the dial to see the graph and enter the value sets for the input voltage (1 and 10 volt) and displayed pressure (in bar).

  Pressure: 0.0 ... 30.0 bar

  Fixed voltage settings: 1 V and 10 V

  Factory settings: (1.0,0) and (10,20.0)

  This means that the 'Pressure' is 0.0 bar at 1 V and 20.0 bar at 10 V.

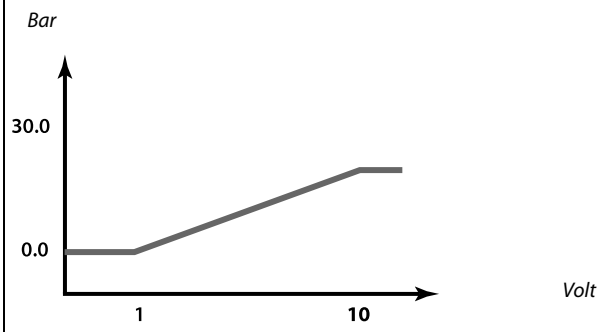
  Typically, the higher the voltage, the higher the displayed pressure.

Or the read-out can be OFF or ON:

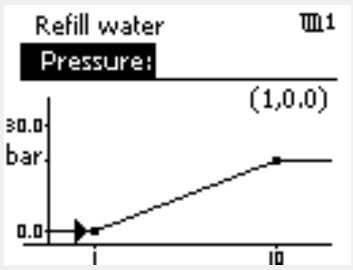
- The pressure is measured by means of a pressure switch. The pressure switch has an open contact when measuring a too low pressure (shown as OFF). When measured pressure is OK, the contact is closed (shown as ON).

  The pressure switch contact (potential free) is connected directly to input S10.

Example: Relationship between input voltage and displayed pressure (in bar)



This example shows that 1 volt correspond to 0.0 bar and 10 volt correspond to 20.0 bar



This scaling menu is always shown, regardless whether a pressure transmitter or a pressure switch is used.

Input type		12327
Circuit	*Setting range*	*Factory setting*
2	**OFF / AI / DI**	**OFF**
Choice of pressure input signal.		

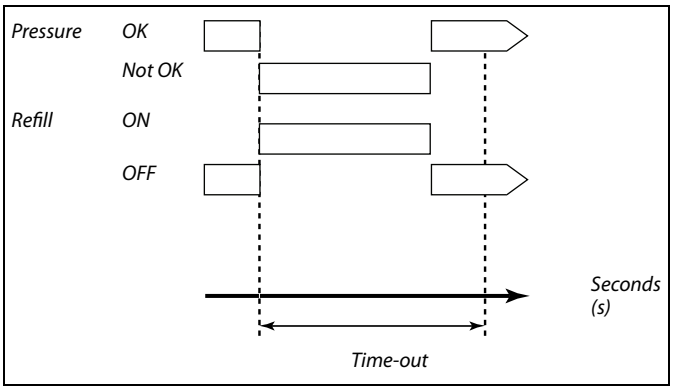
OFF: Pressure signal is not required. The refill water function is disabled.

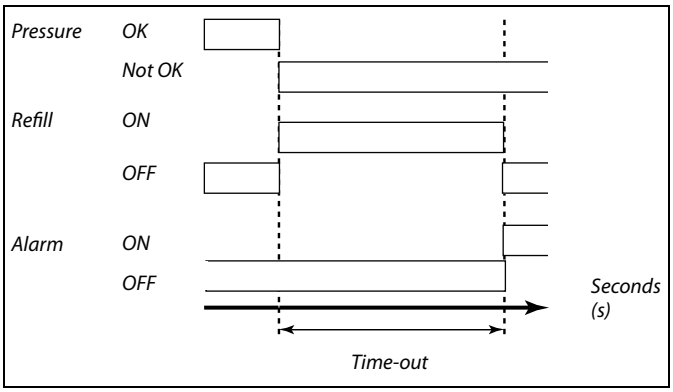
AI: The input signal is an analog signal (0 - 10 V).

DI: The input signal is a digital signal (switch OFF or ON).

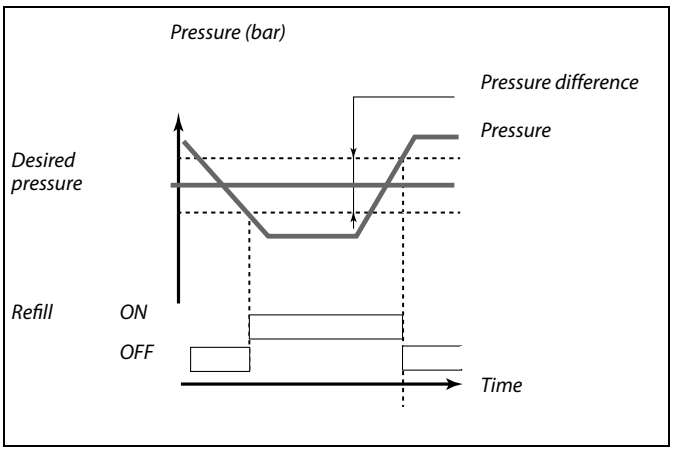
When selecting 'OFF', the refill water system could be self-acting.

Time-out		12323
Circuit	*Setting range*	*Factory setting*
2	**0 ... 1000 s**	**20 s**
Setting of the max. time for refill. The pressure, measured by S10, must be OK within the set time. If not, the refill water function stops and an alarm is activated.		





Pressure, des. (desired pressure)		12321
Circuit	*Setting range*	*Factory setting*
2	**0.0 ... 25.0 bar**	**3.0 bar**
Setting of the desired static pressure on the radiator (consumer) side. See also 'Pressure diff.'		



Pressure, diff. (switching difference)		12322
Circuit	*Setting range*	*Factory setting*
2	**0.1 ... 5.0 bar**	**1.5 bar**
Setting of the switching difference for measured static pressure (pressure transmitter). The difference is symmetrical around the 'Pressure des.' See also 'Pressure des.'		

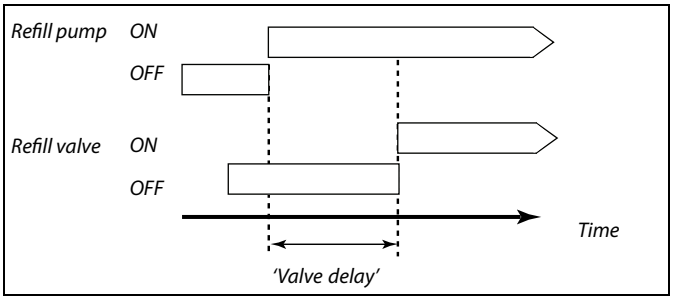
The settings in 'Pressure, des.' and 'Pressure, diff.' have no influence when a pressure switch is used.

P exercise (pump exercise)		12320
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 200 s**	**OFF**
The time the pump is activated during exercise. Exercise takes place every day (at 12:00).		

OFF: No pump exercise.

1 ... 200: Activation time during exercise.

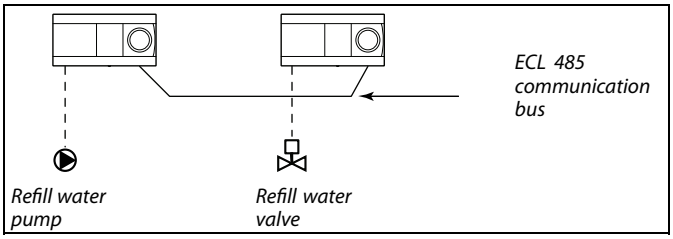
Valve delay		12325
Circuit	*Setting range*	*Factory setting*
2	**0 ... 30 s**	**1 s**
Setting of the time for activation of the ON/OFF valve after start of the refill water pump.		



No. of pumps		12326
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 2**	**1**
Setting of the number of pumps in the refill water circuit.		

OFF: The refill water pump function is controlled by the master controller.

1 ... 2: The refill water function has one or two pumps.



When selecting OFF and a demand for refill occurs, the controller for the actual circuit sends the requirement via the ECL 485 communication bus to the master controller.

The master must be running an application with refill water function. The master starts the refill water pump and sends, via the ECL 485 communication bus, a message that the refill water pump is started. The refill water valve then opens.

The slave must have an address 1 ... 9.

The static pressure is shown in 'Input overview' as a value in bar or OFF / ON.

Example:

OFF: The pressure switch is open (pressure is not OK)

ON: The pressure switch is closed (pressure is OK)

6.8 Application

M exercise (valve exercise)		12023
Circuit	*Setting range*	*Factory setting*
2	**OFF / ON**	**OFF**
Exercises the valve to avoid blocking in periods without heat demand.		

OFF: The valve exercise is not active.

ON: The valve opens for 7 minutes and closes for 7 minutes every third day at noon (12:00 hours).

DHW priority (closed valve / normal operation)		12052
Circuit	*Setting range*	*Factory setting*
2	**OFF / ON**	**OFF**
The heating circuit can be closed when the controller acts as slave and when DHW charging is active in the master.		

This setting must be considered if this controller is a slave.

OFF: The flow temperature control remains unchanged during active DHW charging in the master controller.

ON: The valve in the heating circuit is closed* during active DHW charging in the master controller.
** The desired flow temperature is set to the value set in 'Frost pr. T'*

P frost T		12077
Circuit	*Setting range*	*Factory setting*
2	**OFF / -10 ... 20 °C**	**2 °C**
When the outdoor temperature is below the set temperature in 'P frost T', the controller automatically switches ON the circulation pump to protect the system.		

Under normal conditions, your system is not frost protected if your setting is below 0 °C or OFF.
For water-based systems, a setting of 2 °C is recommended.

OFF: No frost protection.

-10 ... 20: The circulation pump is ON when the outdoor temperature is below the set value.

P heat T (heat demand)		12078
Circuit	*Setting range*	*Factory setting*
2	**5 ... 40 °C**	**20 °C**
When the desired flow temperature is above the set temperature in 'P heat T', the controller automatically switches ON the circulation pump.		

The valve is fully closed as long as the pump is not switched on.

5 ... 40: The circulation pump is switched ON when the desired flow temperature is above the set value.

Frost pr. T (frost protection temperature)		12093
Circuit	*Setting range*	*Factory setting*
2	**5 ... 40 °C**	**10 °C**
Set the desired flow temperature to protect the DHW system against frost.		

5 ... 40: Desired frost protection temperature.

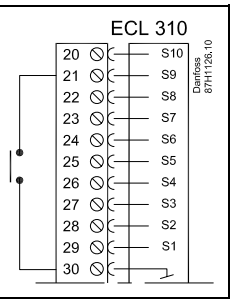
Ext. input (external override) — A361.1 / A361.2		12141
Circuit	*Setting range*	*Factory setting*
2	**OFF / S1 ... S10**	**OFF**
Choose the input for 'Ext. input' (external override). By means of a switch the controller can be overridden to 'Comfort' or 'Saving' mode.		

OFF: No inputs have been selected for external override.

S1 ... S10: Input selected for external override.

If S1... S6 is chosen as override input, the override switch must have gold-plated contacts.
If S7 ... S10 is chosen as override input, the override switch can be a standard contact.

See the drawing for a connection example of an override switch to input S9.

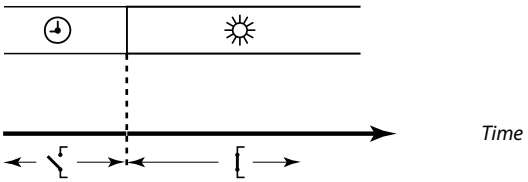


Choose only an unused input for override. If an already used input is applied for override, the functionality of this input is also neglected.

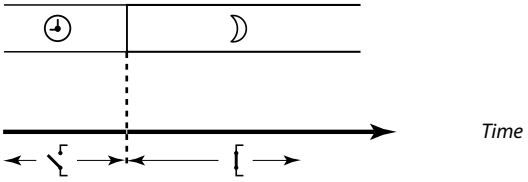
See also 'Ext. mode'.

The two drawings (override to comfort mode and override to saving mode) show the functionality.

Override to 'Comfort' mode



Override to 'Saving' mode



The result of override to 'Saving' mode depends on the setting in 'Total stop'.
Total stop = OFF: Heating reduced
Total stop = ON: Heating stopped

Ext. mode (external override mode)		12142
Circuit	*Setting range*	*Factory setting*
2	**COMFORT / SAVING**	**SAVING**
Choose external override mode.		

The mode override can be activated for saving or comfort mode. For override, the controller mode must be scheduled mode.

SAVING: The controller is in saving mode when the override switch is closed.

COMFORT: The controller is in comfort mode when the override switch is closed.

See also 'Ext. input'.

Min. act. time (min. activation time gear motor)		12189
Circuit	*Setting range*	*Factory setting*
2	**2 ... 50**	**3**
The min. pulse period of 20 ms (milliseconds) for activation of the gear motor.		

Setting example	Value x 20 ms
2	40 ms
10	200 ms
50	1000 ms

The setting should be kept as high as acceptable to increase the lifetime of the actuator (gear motor).

6.9 Alarm

Many applications in the ECL Comfort 210 and 310 series have an alarm function. The alarm function typically activates relay 4 (ECL Comfort 210) or relay 6 (ECL Comfort 310).

The alarm relay can activate a lamp, a horn, an input to an alarm transmitting device etc. etc.

The relay in question is activated as long as the alarm condition is present.

Typical alarms:

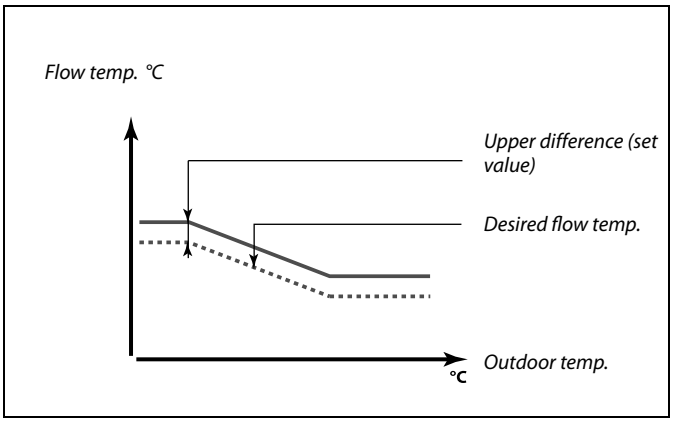
- Actual flow temperature differs from the desired flow temperature.
- An activated circulation pump does not generate a pressure difference.
- The refill water function does not generate a pressure within a preset time.
- A universal alarm input (application dependent) is activated.

6.9.1 Temp. monitor.

Upper difference		**12147**
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 30 K**	**OFF**
The alarm is activated if the actual flow temperature increases more than the set difference (acceptable temperature difference above the desired flow temperature). See also 'Delay'.		

OFF: The alarm function is not active.

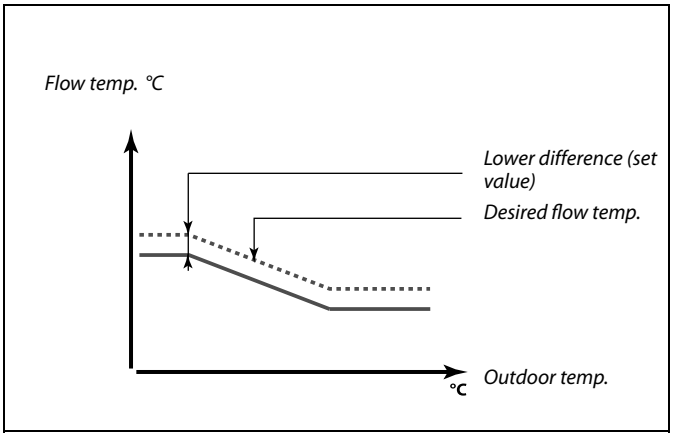
1 ... 30 K: The alarm function is active if the actual temperature gets above the acceptable difference.



Lower difference		**12148**
Circuit	*Setting range*	*Factory setting*
2	**OFF / 1 ... 30 K**	**OFF**
The alarm is activated if the actual flow temperature decreases more than the set difference (acceptable temperature difference below the desired flow temperature). See also 'Delay'.		

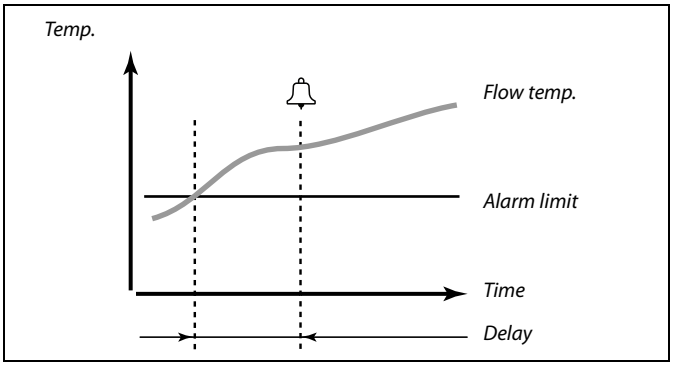
OFF: The alarm function is not active.

1 ... 30 K: The alarm function is active if the actual temperature gets below the acceptable difference.



Delay		12149
Circuit	*Setting range*	*Factory setting*
2	**1 ... 99 m**	**10 m**
If an alarm condition from either 'Upper difference' or 'Lower difference' is present for a longer time than the set delay (in min.), the alarm function is activated.		

1 ... 99 m: The alarm function will be activated if the alarm condition remains after the set delay.



Lowest temp.		12150
Circuit	*Setting range*	*Factory setting*
2	**10 ... 50 °C**	**30 °C**
The alarm function will not be activated if the desired flow temperature is lower than the set value.		

If the cause of the alarm disappears, the alarm indication and output also disappear.

6.9.2 Clear alarm

If an alarm has been generated, a bell is shown in one of the favorite display (see 'Monitoring temperatures and system components') or in an overview display (see 'Understanding the controller display'). The following menus are used to locate the alarm cause and reset (clear) the alarm signal. Even when the cause of the alarm has disappeared, the indication will still be active until the clear alarm procedure has been carried out.

Circ. pumps		12315
Circuit	*Setting range*	*Factory setting*
2	**OFF / ON**	
Choose whether the alarm should be cleared or not.		

OFF: The alarm has not been activated.

ON: The alarm has been activated.

Clear alarm procedure:

If the status is 'ON': Change 'ON' to 'OFF'.

If the status is 'OFF': It is not possible to change it to 'ON'.

Refill water		**12324**
Circuit	*Setting range*	*Factory setting*
2	**OFF / ON**	
Choose whether the alarm should be cleared or not.		

OFF: The alarm has not been activated.

ON: The alarm has been activated.

Clear alarm procedure:

If the status is 'ON': Change 'ON' to 'OFF'.

If the status is 'OFF': It is not possible to change it to 'ON'.

6.9.3 Alarm overview

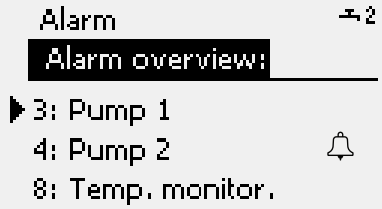
The alarm overview lists the components or functions that could cause an alarm.

The number to the left (i.e. 3, 4, 8) relates to the alarm number which is sent by Modbus communication to a SCADA system.

Two alarm types can be present, ie. the alarms that are logged and the alarms that are not logged.

Example:
The alarm type for 'Pump 1' and 'Pump 2' are logged alarms. This means that the alarm symbol will remain until the alarm has been cleared even if the cause of the alarm has disappeared.

The alarm type for 'Temp. monitor' e.g. is not a logged alarm which means that the alarm symbol will only be present as long as the alarm cause exists.



Example:

'Pump P2' has caused an alarm.

The alarm overview will only list components or functions that could cause an alarm.

7.0 Common controller settings

7.1 Introduction to 'Common controller settings'

Some general settings which apply to the entire controller are located in a specific part of the controller.

To enter 'Common controller settings':

Action:	Purpose:	Examples:
	Choose 'MENU' in any circuit	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose 'Common controller settings'	
	Confirm	

Circuit selector

7.2 Time & Date

It is only necessary to set the correct date and time in connection with the first use of the ECL Comfort controller or after a power break of more than 72 hours.

The controller has a 24 hour clock.

Aut. daylight (Daylight saving time changeover)

YES: The controller's built-in clock automatically changes + / - one hour on the standardized days for daylight saving time changeover for Central Europe.

NO: You change manually between summer and winter time by setting the clock backward or forward.

When controllers are connected as slaves in a master / slave system (via ECL 485 communication bus), they will receive 'Time & Date' from the master.

7.3 Holiday

There is a holiday program for each circuit and a holiday program for the common controller.

Each holiday program contains one or more schedules. Each schedule can be set to a start date and an end date. The set period starts on the start date at 00.00 and stops on end date at 24.00.

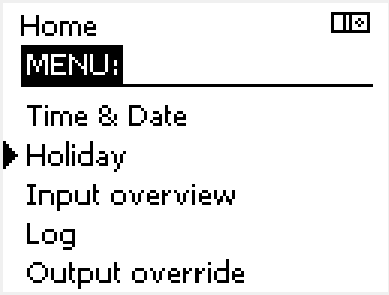
Selectable modes are Comfort, Saving, Frost protection or Comfort 7-23 (before 7 and after 23, the mode is scheduled).

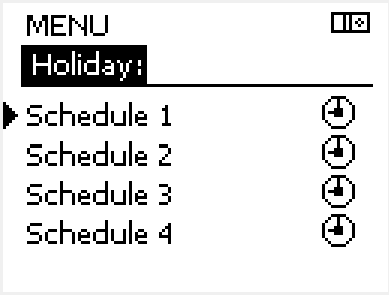
How to set your holiday schedule:

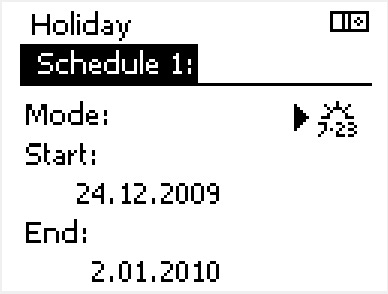
Action:	Purpose:	Examples:
	Choose 'MENU'	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose a circuit or 'Common controller settings'	
	Heating	
	DHW	
	Common controller settings	
	Confirm	
	Go to 'Holiday'	
	Confirm	
	Choose a schedule	
	Confirm	
	Confirm choice of mode selector	
	Choose mode	
	· Comfort	
	· Comfort 7–23	
	· Saving	
	· Frost protection	
	Confirm	
	Enter the start time first and then the end time	
	Confirm	
	Go to 'Menu'	
	Confirm	
	Choose 'Yes' or 'No' in 'Save'. Choose the next schedule, if required	

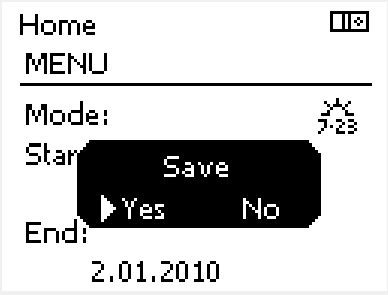
The holiday program in the 'Common controller settings' is valid for all circuits. The holiday program can also be set individually in the heating or DHW circuits.

The end date must be at least be one day later than the start date.









The ECA 30 / 31 cannot override the holiday schedule of the controller temporarily.

However, it is possible to make use of the following options from the ECA 30 / 31 when the controller is in scheduled mode:

- Day off
- Holiday
- Relaxing (extended comfort period)
- Going out (extended saving period)

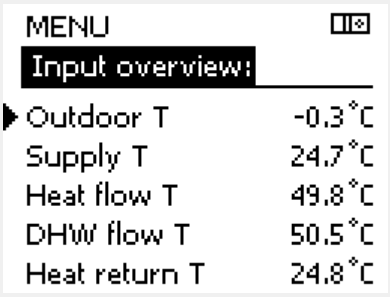
Energy-saving trick:
Use 'Going out' (the extended saving period) for airing purposes (e.g. for ventilating the rooms by means of fresh air from open windows).

7.4 Input overview

The input overview is located in the common controller settings.

This overview will always show you the actual temperatures in the system (read-only).

In addition to the measured temperatures, pressures, pressure switches and alarm switches are indicated as follows:



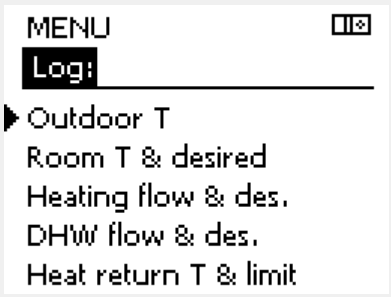
Input:	Status:	
Static pressure:	1.9 bar (example)	The input is set to OFF or a 0–10 V input (analog input = 'AI').
	OFF: Pressure not OK	The input is set as a switch input (digital input = 'DI').
	ON: Pressure OK	
S7 (S8, S9) status:	OFF	The input is activated by means of a differential pressure switch or an alarm contact, i.e. connected to terminal 30.
	ON	The input is not activated.

7.5 Log

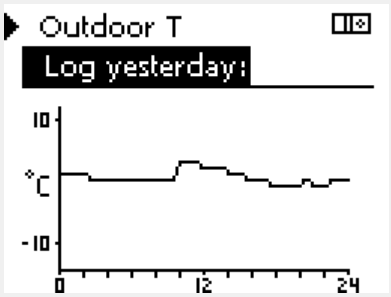
The log function (temperature history) allows you to monitor the logs of today, yesterday, the past 2 days as well as the past 4 days for the connected sensors.

There is a log display for the relevant sensor, showing the measured temperature.

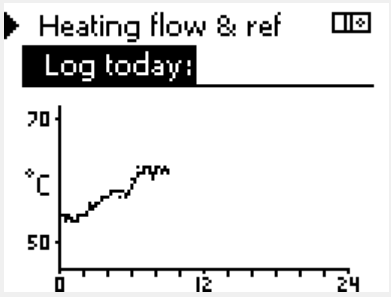
The log function is only available in the 'Common controller settings'.



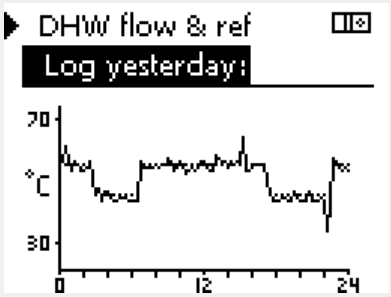
Example 1:
1 day log for yesterday showing the development in outdoor temperature during the past 24 hours.



Example 2:
Today's log for the actual heating flow temperature as well as the desired temperature.



Example 3:
Yesterday's log for the DHW flow temperature as well as the desired temperature.



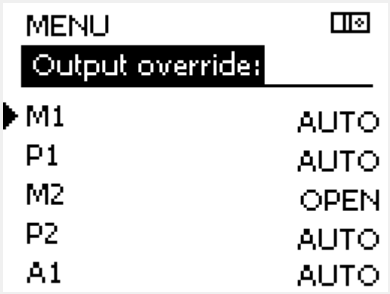
7.6 Output override

The output override is used to disable one or more of the controlled components. This could among others be useful in a service situation.

Action:	Purpose:	Examples:
	Choose 'MENU' in any of the overview displays	MENU
	Confirm	
	Choose the circuit selector at the top right corner in the display	
	Confirm	
	Choose common controller settings	
	Confirm	
	Choose 'Output override'	
	Confirm	
	Choose a controlled component	M1, P1 etc.
	Confirm	
	Adjust the status of the controlled component: Motorized control valve: AUTO, STOP, CLOSE, OPEN Pump: AUTO, OFF, ON	
	Confirm status change	

Remember to change the status back again as soon as an override is not required any longer.

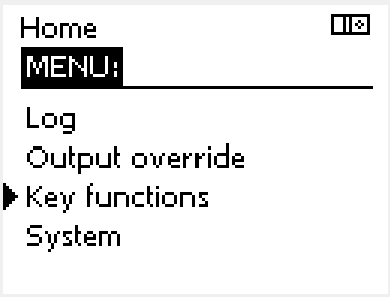
Controlled components *Circuit selector*



When the selected controlled component (output) is not 'AUTO', the ECL Comfort controller does not control the component in question (pump or motorized control valve e.g.). Frost protection is not active.

7.7 Key functions

New application	**Erase application:** Removes the existing application. As soon as the ECL key is inserted, another application can be chosen.
Application	Gives an overview over the application and its subtypes of the ECL key in question.
Factory setting	**System settings:** System settings are, among others, communication set-up, display brightness etc.
	User settings: User settings are, among others, desired room temperature, desired DHW temperature, schedules, heat curve, limitation values etc.
	Go to factory: Restores the factory settings.
Copy	**To:** Copy direction
	System settings
	User settings
	Start copying



A more detailed description of how to use the individual 'Key functions' can also be seen in 'Inserting the ECL application key'.

7.8 System

7.8.1 ECL version

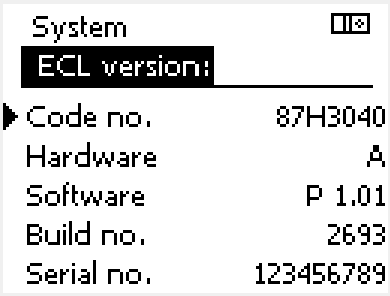
In 'ECL version' you will always be able to find an overview of the data related to your electronic controller.

Please have this information available if you need to contact your Danfoss sales organization concerning the controller.

Information about your ECL Application Key can be found in 'Key functions' and ' Key overview'.

Code no.:	The Danfoss sales and order no. for the controller
Hardware:	Hardware version of the controller
Software:	Software version of the controller
Serial no.:	Unique number for the individual controller
Production week:	Week no. and year (WW.YYYY)

Example, ECL version



7.8.2 Display

Backlight (display brightness)		**60058**
Circuit	*Setting range*	*Factory setting*
	0 ... 10	**5**
Adjust the brightness of the display.		

0: Weak backlight.

10: Strong backlight.

Contrast (display contrast)		**60059**
Circuit	*Setting range*	*Factory setting*
	0 ... 10	**3**
Adjust the contrast of the display.		

0: Low contrast.

10: High contrast.

7.8.3 Communication

Modbus addr.		**38**
Circuit	*Setting range*	*Factory setting*
	1 ... 247	**1**
Set the Modbus address if the controller is part of a Modbus network.		

1 ... 247: Assign the Modbus address within the stated setting range.

ECL 485 addr. (master / slave address)		2048
Circuit	*Setting range*	*Factory setting*
☐|○	**0 ... 15**	**15**
This settting is relevant if more controllers are working in the same ECL Comfort system (connected via the ECL 485 communication bus) and / or Remote Control Units (ECA 30 / 31) are connected.		

0: The controller works as slave.
The slave receives information about the outdoor temperature (S1), system time, and signal for DHW demand in the master.

1 ... 9: The controller works as slave.
The slave receives information about the outdoor temperature (S1), system time, and signal for DHW demand in the master. The slave sends information about the desired flow temperature to the master.

10 ... 14: Reserved.

15: The ECL 485 communication bus is active.
The controller is master. The master sends information about the outdoor temperature (S1) and system time. Connected Remote Control Units (ECA 30 / 31) are powered.

The ECL Comfort controllers can be connected via the ECL 485 communication bus to perform a larger system (the ECL 485 communication bus can connect to max. 16 devices).

Each slave must be configured with its own address (1 ... 9).

However, more slaves can have the address 0 if they only have to receive information about outdoor temperature and system time (listeners).

The total cable length of max. 200 m (all devices incl. the internal ECL 485 communication bus) should not be exceeded.
Cable lengths of more than 200 m may cause noise sensibility (EMC).

Service Pin		2150
Circuit	*Setting range*	*Factory setting*
☐|○	**0 / 1**	**0**
This setting is only used in connection with set-up of Modbus communication.		

Ext. reset		2151
Circuit	*Setting range*	*Factory setting*
☐|○	**0 / 1**	**0**
This setting is only used in connection with set-up of Modbus communication.		

7.8.4 Language

Language		2050
Circuit	*Setting range*	*Factory setting*
☐|○	**English / 'Local'**	**English**
Choose your language.		

Local language is selected during installation. If you want to change to another local language, the application must be reinstalled. However, it is always possible to change between the local language and English.

8.0 Miscellaneous

8.1 Frequently asked questions

The definitions apply to the Comfort 210 as well as ECL Comfort 310 series. Consequently, you might come across expressions that are not mentioned in your guide.

The time shown in the display is one hour off?
See 'Time and Date'.

The time shown in the display is not correct?
The internal clock may have been reset, if there has been a power break for more than 72 hours.
Go to the 'Common controller settings' and 'Time & Date' to set the correct time.

The ECL Application Key is lost?
Switch the power off and on again to see the system type and the software generation of the controller or go to 'Common controller settings' >'Key functions' > 'Application'. The system type (e.g. TYPE A266.1) and the system diagram is displayed.
Order a replacement from your Danfoss representative (e.g. ECL Application Key A266).
Insert the new ECL Application Key and copy your personal settings from the controller to the new ECL Application Key, if required.

The room temperature is too low?
Make sure that the radiator thermostat does not limit the room temperature.
If you still cannot obtain the desired room temperature by adjusting the radiator thermostats, the flow temperature is too low. Increase the desired room temperature (display with desired room temperature). If this does not help, adjust the 'Heat curve' ('Flow temp.').

The room temperature is too high during saving periods?
Make sure that the min. flow temperature limitation ('Temp. min.') is not too high.

The temperature is unstable?
Check that the flow temperature sensor is correctly connected and in the right place. Adjust the control parameters ('Control par.').
If the controller has a room temperature signal, see 'Room limit'.

The controller does not operate and the control valve is closed?
Check that the flow temperature sensor is measuring the correct value, see 'Daily use' or 'Input overview'.
Check the influence from other measured temperatures.

How to make an extra comfort period in the schedule?
You can set an additional comfort period by adding new 'Start' and 'Stop' times in 'Schedule'.

How to remove a comfort period in the schedule?
You can remove a comfort period by setting start and stop times to the same value.

How to restore your personal settings?
Please read the chapter concerning 'Inserting the ECL Application Key'.

How to restore the factory settings?
Please read the chapter concerning 'Inserting the ECL Application Key'.

Why can't the settings be changed?
The ECL Application Key has been removed.

How to react on alarms?
An alarm indicates that the system is not operating satisfactorily.
Please contact your installer.

What does P and PI control mean?
P control: Proportional control.
By using a P control, the controller will change the flow temperature proportional to the difference between a desired and an actual temperature, e.g. a room temperature.
A P control will always have an offset which not will disappear over time.

PI control: Proportional and Integrating control.
A PI control does the same as a P control, but the offset will disappear over time.
A long 'Tn' will give a slow but stable control, and a short 'Tn' will result in a fast control but with a higher risk of unstability.

8.2 Definitions

The definitions apply to the Comfort 210 as well as ECL Comfort 310 series. Consequently, you might come across expressions that are not mentioned in your guide.

Air duct temperature
Temperature measured in the air duct where the temperature is to be controlled.

Alarm function
Based on the alarm settings, the controller can activate an output.

Anti-bacteria function
For a defined period, the DHW temperature is increased in order to neutralize dangerous bacteria, e.g. Legionella.

Balance temperature
This setpoint is the basis for the flow / air duct temperature. The balance temperature can be adjusted by the room temperature, the compensation temperature and the return temperature. The balance temperature is only active if a room temperature sensor is connected.

Comfort operation
Normal temperature in the system controlled by the schedule. During heating the flow temperature in the system is higher to maintain the desired room temperature. During cooling the flow temperature in the system is lower to maintain the desired room temperature.

Comfort temperature
Temperature maintained in the circuits during comfort periods. Normally during daytime.

Compensation temperature
A measured temperature influencing the flow temperature reference / balance temperature.

Desired flow temperature
Temperature calculated by the controller on basis of the outdoor temperature and influences from the room and / or return temperatures. This temperature is used as a reference for the control.

Desired room temperature
Temperature which is set as the desired room temperature. The temperature can only be controlled by the ECL Comfort controller if a room temperature sensor is installed.
If a sensor is not installed, the set desired room temperature however still influences the flow temperature.
In both cases the room temperature in each room is typically controlled by radiator thermostats / valves.

Desired temperature
Temperature based on a setting or a controller calculation.

Dew point temperature
Temperature at which the humidity in the air condensates.

DHW circuit
The circuit for heating the domestic hot water (DHW).

Factory settings
Settings stored on the ECL Application Key to simplify the set up of your controller the first time.

Flow temperature
Temperature measured in the flow at any time.

Flow temperature reference
Temperature calculated by the controller on basis of the outdoor temperature and influences from the room and / or return temperatures. This temperature is used as a reference for the control.

Heat curve
A curve showing the relationship between actual outdoor temperature and required flow temperature.

Heating circuit
The circuit for heating the room / building.

Holiday schedule
Selected days can be programmed to be in comfort, saving or frost protection mode. Besides this, a day schedule with comfort period from 07.00 to 23.00 can be selected.

Humidity, relative
This value (stated in %) refers to the indoor moisture content compared to the max. moisture content. The relative humidity is measured by the ECA 31 and is used for the calculation of the dew point temperature.

Limitation temperature
Temperature that influences the desired flow / balance temperature.

Log function
The temperature history is displayed.

Master / slave
Two or more controllers are interconnected on the same bus, the master sends out e.g. time, date and outdoor temperature. The slave receives data from master and sends e.g. desired flow temperature value.

Pt 1000 sensor
All sensors used with the ECL Comfort controller are based on the Pt 1000 type (IEC 751B). The resistance is 1000 ohm at 0 °C and it changes with 3.9 ohm / degree.

Optimization
The controller optimizes the start time of the scheduled temperature periods. Based on the outdoor temperature, the controller automatically calculates when to start in order to reach the comfort temperature at the set time. The lower the outdoor temperature, the earlier the start time.

Outdoor temperature trend
The arrow indicates the tendency, i.e. whether the temperature rises or falls.

Refill water function
If the measured pressure in the heating system is too low (e.g. due to a leakage), water can be supplemented.

Return temperature
The temperature measured in the return influences the desired flow temperature.

Room temperature sensor
Temperature sensor placed in the room (reference room, typically the living room) where the temperature is to be controlled.

Room temperature
Temperature measured by the room temperature sensor or the Remote Control Unit. The room temperature can only be controlled directly if a sensor is installed. The room temperature influences the desired flow temperature.

Schedule
Schedule for periods with comfort and saving temperatures. The schedule can be made individually for each week day and may consist of up to 3 comfort periods per day.

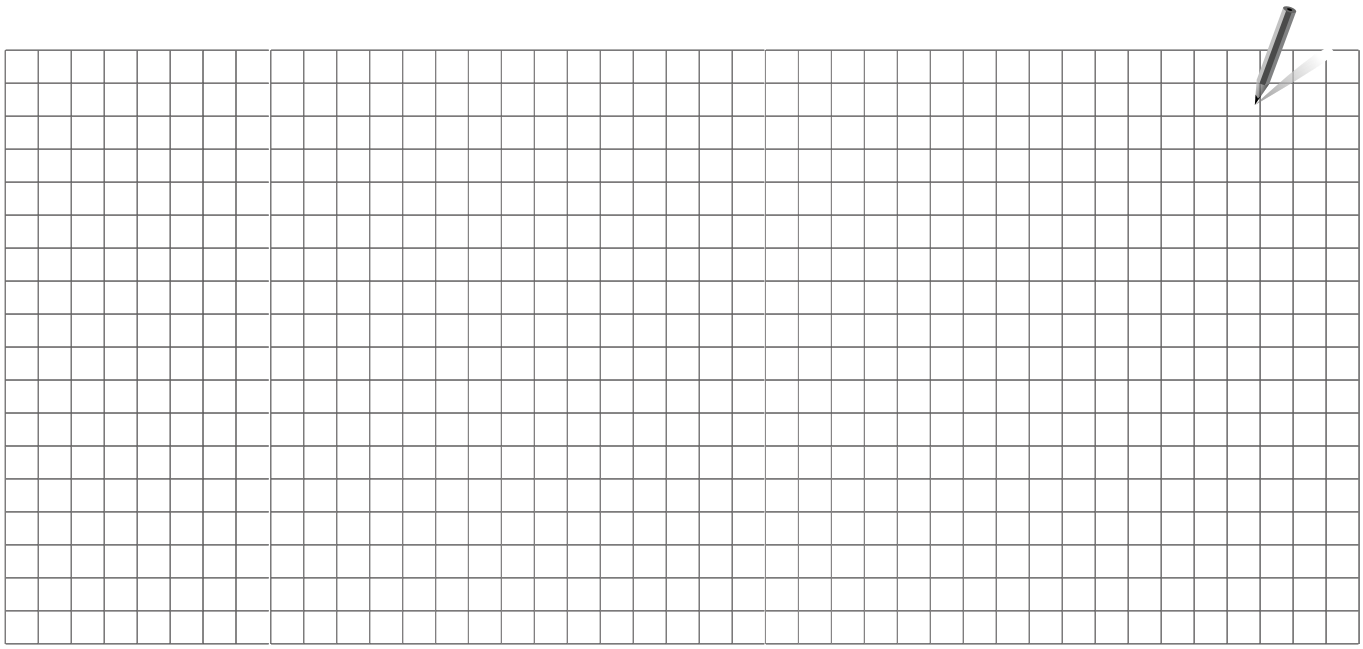
Saving temperature
Temperature maintained in the heating / DHW circuit during saving temperature periods.

Pump control
One circulation pump is working and the other is the spare circulation pump. After a set time, the roles are exchanged.

Weather compensation
Flow temperature control based on the outdoor temperature. The control is related to a user-defined heat curve.

2-point control
ON / OFF control e.g. circulation pump, change-over valve or damper control.

3-point control
Opening, closing or no action of the actuator for the motorized control valve. No action means that the actuator remains in its current position.



Installer:

By:

Date:

Installation Guide ECL Comfort 310, application A361

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